THE IRON TRADE REVIEW

VOLUME XXXII. CLEVELAND, O. MARCH 23, 1899. CHICAGO, ILL. NUMBER 12

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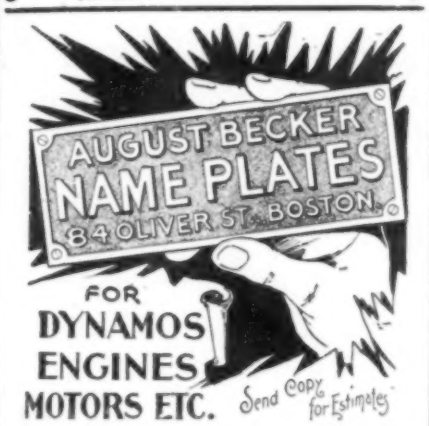

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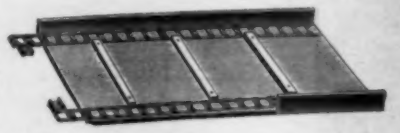

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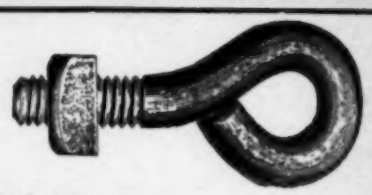

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THE IRON TRADE REVIEW

VOLUME XXXII. CLEVELAND, O. MARCH 23, 1899. CHICAGO, ILL. NUMBER 12

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

An important stage has been reached in the steady advance in iron—the point at which the prices realized on fractional parts of the business on furnace and steel works books are to be made the basis of large transactions for the second half of the year. From an unwillingness to consider such values as more than an index of temporary scarcity, the trade has become familiar enough with them, in the past quarter, and with the conditions that are supporting them, to admit now that their duration will be a matter of months. Practically the only question now asked is, how much farther is the rise to go? Here experience and insight are of little value, except to suggest that prices are approaching the limit. Those in the trade who thought a short time ago to put forth some effort at control, drew their imaginary safety line at a point past which the trade has swept without a sign of hesitation. Now no time is being devoted to propagating conservatism; selling material at what it will bring in the market has proved vastly more profitable. Producers of Bessemer pig iron, who from their close relation with ore producers in many cases, have been influenced by the extreme caution of the latter, are taking counsel of the ore men's mistake, and of the plain conclusions to be drawn from $40 plates, $30 bars and $24 billets made from $10 iron. From believing that prices of basal materials would help to fix the market for finished forms, independent furnacemen are now disposed to let the demand at the other end of the line make figures for them as well as for the steel maker. The fact that so important a percentage of the Bessemer iron producing capacity of the Central West is sold on the market and that the newly formed steel works combine is its chief consumer, gives these two sets of interests for the moment the key to the situation for the second half of the year. For some weeks sales of sheet bars, rod billets and merchant bar billets for the second half have been waiting on the formation of the National Steel Co.; and now the question of price has come back to the Bessemer furnacemen. The nominal price the past week has been $14.50 for Bessemer iron, second quarter delivery; but there was practically none to sell. In the next few days it may be expected that the basis will be fixed for business for the second six months, and then, in turn, tin plate mills, sheet mills, rod mills and bar mills will know what they will have to pay for steel. Thus a considerable volume of business running into a variety of lines is hanging on a decision that will no doubt be made before another week's review is written. Speaking generally of the past week it has brought a smaller volume of transactions than any one of several weeks preceding. Buyers are coming to the conclusion that the conditions are not sufficiently developed for committing themselves, at present prices, on all their wants for the balance of the year. In foundry iron it has been evident that iron was being contracted for in advance of usual buying times, and in many cases as a precaution against further advances, and buyers thus have been steadily putting up the price on themselves. In Eastern markets foundry iron has advanced about $1 a ton on the past week. At Chicago local No. 2 foundry is now $14.50 to $15, and Southern No. 2 has sold at $12 Birmingham. Preparations to get old furnaces into line are going on, but in view of the small capacity of most of these and the time required to make repairs and get machinery and fuel and ore supplies, it will be several months before they will make any particular impression. Sheets and plates have been stationary the past week. Bars are higher, East and West, the Eastern advance coming in part through the adoption of the Western schedule of extras. The plate market may show less tension when present shipbuilding contracts are finished. There are signs that projected vessel work and some building enterprises may be held up in view of present prices. This element may be felt in time in checking the advance. The trade is especially alert just now for indications of this sort. The publications concerning further wire nail advances are incorrect. The price of last week—$2 base for carloads, Cleveland and Pittsburg, is still maintained. The bar iron consolidation now seems to be sure and a charter will be taken soon, with capital of $15,000,000. Thirty-six mills are to be included.

PITTSBURG.

OFFICE OF *The Iron Trade Review and Industrial World.*
705 PUBLICATION BUILDING, March 22.

The iron and steel market is rather quieter than a week ago, due mainly to the fact that buyers are taking the situation more calmly, and in many cases have decided to wait, feeling that there is little likelihood of prices going up further; but there is still enough demand, for which there is scarcely any supply, to maintain prices at a high level, and in fact the pressing needs of some buyers have forced prices up in a number of lines during the past week. The situation would be greatly cleared if the Valley price for Bessemer for the latter half of the year were known, but so far no action has been taken, although something definite is probable as the result of the meeting to be held this week. This price will have a far-reaching influence, because practically no Bessemer iron produced in the Pittsburg district is sold, the product being used by the owners in making steel, and the steel makers generally are unwilling to talk prices until they know just where they had best be placed. Furnaces have had $14.50 as their minimum the past week. In all lines there is great pressure to secure deliveries, and mills are all behind. The scarcity of steel is becoming very pronounced, and finishing mills are in great straits.

PIG IRON.—The price committee of the Valley Furnacemen's Association failed to arrive at any conclusion at the meeting held last Thursday, either as to price or as to selling for the latter half of the year. Another meeting is to be held in Cleveland this week, when action will likely be taken, and it is probable that the decision will be to sell for the third quarter, and possibly also for the fourth, at a price not above $15, while it may be placed at $14.50. For delivery up to July 1 the furnaces have practically no iron to sell. There is still probably between 10,000 and 15,000 tons of pig iron in outside hands, partly stored, from which odd lots are being sold to supply occasional pressing needs of buyers. The price paid for such lots is generally from $14.50 to $14.75, and the demand is not important at this figure, as the uncertainty is well understood. There is likely to be heavy buying when the regular price is announced. There is no Pittsburg Bessemer offered. The famine in mill iron is still more pronounced, and sales have been made this week as high as $15 a ton,

Pittsburg, which indicates how pressing are the needs of buyers in isolated cases, as the turnover in all lines of pig iron is very small. In foundry irons occasional lots are sold, and the basis for No. 2 foundry lies between the limits of $15 and $16, Pittsburg. We quote as follows, the prices being in part nominal, and in no cases representing large sales:

Bessemer, valley furnace	$14.50 to 15.00
Bessemer, Pittsburg	15.00 to 15.25
No. 1 Foundry	15.50 to 16.00
No. 2 Foundry	15.00 to 16.00
No. 3 Foundry	14.50 to 15.00
Gray Forge, valley furnace	14.00 to 15.00
Gray Forge, Pittsburg	14.50 to 15.00

STEEL.—The scarcity of steel is becoming more pronounced every day, and there is scarcely a finishing mill which is not feeling the effects. The difficulty is due not alone to the pressure on the finishing mills for their raw material, but also to the fact that the amount of steel coming out is below the normal, due to a variety of causes, the principal one of which is the greater amount of steel which is being worked up right in the plants which produce it. There have been odd lots of steel sold here and there for $25, Pittsburg, and the market may be quoted safely at from $25 to $26. The National Steel Co. has not, so far as can be learned, sold any material, and is, in fact, unable to fill with the desired promptness the contracts with which it entered into business as even the American Tin Plate Co., an interest which is generally supposed to be close to it, is suffering severely from inability to get bars, and has been out of the market for some time.

FERRO-MANGANESE.—This line is very strong, and we quote $55 to $60 for domestic 80 per cent.

STRUCTURAL MATERIAL.—Following the advance of a dollar a ton in angles mentioned last week, another advance of a dollar is to be quoted this week, the other shapes being unchanged. The demand is very heavy for the time of the year, and structural mills will have the busiest summer they have known for some time. We now quote: Beams and channels, 3 to 15 inches, 1.40c; 18 to 24 inches, 1.50c; tees, 1.45c; zees, 1.40c; and angles, 1.40c to 1.45c; universal mill plates, 2c.

RAILS AND TRACK MATERIAL.—Track material is very strong and prices are well maintained at the prices last quoted. There is nothing doing in rails, prices on which are firm. We quote: Spikes 1.60c; track bolts, 1.80c to 1.85c; splice bars, 1.40c; links and pins, 1.60c to 1.70c.

BARS.—The market for steel bars is a trifle stronger than at last report, though 1.45c is still being done in cases, and we quote the market at 1.45c to 1.50c. Iron bars are very strong, and 1.40c is the lowest buyers can do.

PLATES.—There has been no notable change in the plate market since last week, due to the uncertainty as to raw materials. The mills can supply scarcely anything this side of July 1, and for the latter half are unwilling to quote freely until the situation is somewhat cleared up. Some bids have been made on the basis of 2c for tank plate for the latter half of the year, and some little selling has been done; but the bulk of the tonnage, outside of some contracts already made with deliveries running a month or two into the second half, remains to be placed. We quote prices largely nominal as follows: Tank plate, 2c; shell, 2.05c; flange, 2.10c; fire box, 2½c to 3½c.

SHEETS.—There is practically no market in sheet iron at the present time, as the sheet mills are fully sold up for the present, at least so far as they have covered for raw material, and they are unwilling to sell further ahead. No. 28 common may be put anywhere from 2.40c up. Some sales of very heavy gauges have been made at prices above 2½ cents. Galvanized is very strong, and it is doubtful if 75 per cent off could be done except for a small lot.

PIPES AND TUBES.—An advance was made Tuesday in boiler tubes, the discount in all lines being reduced by 5 points, which means an advance of a shade over 15 per cent in the bulk of the tonnage which is for steel tubes above 2¼ inch, the quotation on which is reduced from 67½ to 62½. In all pipes and tubes the demand is very good and dealers are sending in orders freely, while prices are well maintained, and in some cases it is claimed prices above the schedule are paid. Steady progress is being made in the movement to consolidate the mills, and a number of options have been given, covering probably two-thirds of the plants. It is understood that in general the purchase will be of the plants and material on hand, rather than of the stock in the companies. We quote prices as follows: Merchant pipe, base discount 60 per cent and additional discounts five 10's for less than carloads and five 10's and 5 for carloads, with free delivery on the latter within the prescribed territory; lap weld casing, 52½ and 10 for screw and socket joint and 52½ for inserted joint, with 5 per cent additional on carload orders; boiler tubes, 1¼ to 1½-inch, 45 per cent; 1¾ to 2½-inch 55 for iron and 60 for steel; 2¾ to 6-inch, 60 for iron and 62½ for steel, all with an extra 5 per cent to dealers.

SPELTER.—The spelter market has recovered considerably since last report, and is now 6.30c to 6.40c, Pittsburg, with New York quoting about the same, and St. Louis 6.20c.

OLD MATERIAL.—There is very little trading in this line, but prices are firmer and in some cases quotably higher. We quote as follows: Melting stock $12.75 to $13; old steel rails, long lengths, $12 to $12.50; cut, $12.50 to $13; old iron rails, $17 to $18; wrought iron scrap, $15 to $16, valley; cast borings, $7 net, valley; busheling scrap, $10 to $11, net; car wheels, $14 to 14.50, gross; cast scrap, $11, gross; charcoal scrap, $12, gross; wrought turnings $7.50 to $8, net, valley.

COKE.—There has been considerable demand for furnace coke and prices have become somewhat irregular. It is reported that sales of furnace coke for the second half of the year have been made as high as $2, but we quote the market at $1.60 to $1.75 for strictly Connellsville coke, and foundry and crushed coke at $2.30.

CHICAGO.

OFFICE OF *The Iron Trade Review and Industrial World.*
1522 MONADNOCK BLOCK, March 22.

The market has changed very little in the week. Advances have been made in the prices of some classes of material, while others have maintained the level of a week ago. Sales have not been large, as mills and furnaces are unable to take much business for close delivery, and are not desirous of taking orders to any extent for the farther future. Buyers, too, have satisfied their wants in part, and some of them seem to think that prices have nearly, if not quite reached the top, and that there is little to be made in besieging sellers with inquiries for the second half of the year. Not many users of iron and steel are short of a supply for the next few months.

PIG IRON.—The week was quiet, with only comparatively small sales of either Northern or Southern iron. Prices of Northern irons are unchanged, although some sales have been made at higher figures than we quote as a minimum. Southern prices are about the same as last week's. One or two furnaces are asking 50 cents to $1 a ton more for their iron, but others are charging the same rate as last week. The demand for iron continues good, and while no large buyers are in the market at present the furnaces are securing all the orders they care to accept for immediate delivery. No large purchases for future delivery were made last week. Prices are as follows:

Lake Sup. Charcoal	$15 50 @ $16 50	Southern Coke No. 3	$14 75 @ 15 00
Local Coke Fdy. No. 1	15 00 @ 15 50	Southern No. 1 Soft	15 50 @ 16 00
Local Coke Fdy. No. 2	14 50 @ 15 00	Southern No. 2 Soft	15 00 @ 15 50
Local Coke Fdy. No. 3	14 00 @ 14 50	Southern Silveries	15 50 @ 16 00
Local Scotch Fdy. No. 1	15 00 @ 15 50	Jackson Co. Silveries	15 00 @ 16 00
Local Scotch Fdy. No. 2	14 50 @ 15 00	Ohio Strong Softeners	15 00 @ 16 00
Local Scotch Fdy. No. 3	14 00 @ 14 50	Alabama Car Wheel	17 50 @ 18 00
Southern Coke No. 1	15 50 @ 16 00	Malleable Bessemer	15 00 @ 15 50
Southern Coke No. 2	15 00 @ 15 50	Coke Bessemer	15 00 @ 15 50

BARS.—Bar manufacturers are confident of the ultimate success of the scheme to consolidate the mills, and say that the deal will be put through within the next two weeks. No information is to be had regarding the mills to be included in the arrangement, beyond the first report that none are to be omitted. The market last week was quiet, with comparatively small sales, and not a very large demand for mill shipment. Most mills would be unable to accept much business for anything like immediate shipment, and buyers appear to think prices are higher than will prevail later in the year. In fact, many mill men believe that present prices are higher than is necessary or fair. Store business has been good, and stores have secured top prices for what they had to sell, in every case. Common iron is quoted at 1.45c up, mill shipment, while sales from store are made as high as 1.65c or more. Steel bars are quoted at 1.50c, from mill, and 1.65c to 1.75c from store.

RAILS AND TRACK SUPPLIES.—Sales of both light and standard sections last week were only small. The price of standard sections has been advanced $1 a ton. Quotations are as follows: Standard section rails, $24 to $25; light rails, $23 and upwards; steel splice bars, 1.40c to 1.50c; track bolts with square nuts, 1.80c to 1.90c; hexagon nuts, 1.90c to 2c; spikes, 1.55c to 1.60c.

CAR ORDERS.—The Pennsylvania system is said to have bought 4,000 or more cars in the past two weeks. The Lehigh Valley is figuring on 1,000 or more cars. Several other roads are taking figures on cars, in small lots, in most cases. Orders are excellent, and business in car material of all kinds is consequently good. The largest Pittsburg interest has been compelled to refuse orders for axles and axle billets in the past week.

BILLETS AND RODS.—Very little business was done last week, and the local mills took no orders. Bessemer billets are quoted at $23.50; open hearth billets, $26; and rods, $31, although all prices are only nominal.

STRUCTURAL MATERIAL.—The Geo. A. Fuller Co. took orders for three large buildings in the East last week, the contracts for the material being placed through the Chicago office of a Pittsburg mill. These contracts amount to about 4,500 tons. Orders for about 4,000 tons of bridge material were placed, in small lots. Other business was light, and was limited to small orders. The Schlitz brewery of Milwaukee is figuring on an addition which will take 1,200 tons. Prices of extras on beams have been advanced $1 a ton, and angles and tees are higher. No other changes have been made. Quotations are as follows: Beams, 15 inch and under, 1.55c to 1.60c; 18 inch and over, 1.65c to 1.70c; angles, 1.55c to 1.65c; sheared plates, 2.10c to 2.20c; universal plates, 2.10c to 2.20c; tees, 1.60c to1.65c; zees, 1.55c to 1.60c. Small lots from stock are quoted at ¼c to ½c higher.

PLATES.—Sales from mill were not large last week, as none of the mills are in position to accept much business. Store business was good, and would have been larger if the dealers had been willing to accept all the business offered. Quotations are as follows: Tank plates, 2.10c to 2.20c; flange steel, 2.20c to 2.40c; marine, 2.20c to 2.40c; fire box steel, 2.25c to 4c.

SHEETS.—The market is very firm, with almost no mills willing to take all the business offered them. Prices are higher, and are made at 2.50c to 2.70c for No. 27 black sheets. Galvanized sheets are selling at 75 per cent off.

MERCHANT STEEL.—The demand continues, and quite large sales were made last week, including several good-sized contracts. Prices are higher, as follows: Open-hearth spring, tire and machinery steel, 2.30c to 2.35c; smooth finished machinery steel, 2.35c to 2.45c; smooth-finished tire steel, 2.15c to 2.25c; tool steel, 6c to 7.50c; specials, 10c and upwards.

WIRE AND WIRE NAILS.—Considerable sales of wire and nails were made last week, and the demand grows with every week. Prices are unchanged: Wire nails, $2.15; painted barb wire, $2.25; galvanized barb wire, $2.65; plain, $2; all at Joliet, in car lots; less than car lots are quoted 10 cents higher.

SCRAP.—Cast scrap is in short supply, and buyers have been unable to secure it in as large quantities as desired. Several quite large purchases of this and other grades of scrap were made last week. The market is advancing steadily, and higher prices are made on some grades this week Dealers' selling prices are as follows:

Old iron rails, gross,	$16 25@$16 50	Axles, net	$17 00@$17 50
Old steel rails, long, gr.	10 75@ 11 00	Cast borings, net	5 50@ 6 00
Old steel rails, short	9 50@ 10 00	Wrought turnings, net	7 25@ 7 75
Old wheels, gross	15 25@ 15 75	Axle turnings, net	9 00@ 9 50
Railroad forge, net	14 00@ 14 25	Mixed steel, gross	8 00@ 8 25
Dealer's forge, net	11 50@ 12 00	Stove plates, net	8 00@ 8 50
No. 1 mill, net	9 50@ 10 00	Heavy melting steel, gr.	9 50@ 9 75
Heavy cast, net	11 00@ 12 00	Old iron splice b., net.	16 00@16 25
Malleable cast, net	8 00@ 9 00		

CLEVELAND.

OFFICE OF *The Iron Trade Review and Industrial World*, 27 VINCENT ST., March 22.

Occasional trades in ore are reported, but chiefly through resales, and in part from the sale of Mesabi non-Bessemers, which are to be mined in larger quantity than in any preceding year. In a recent sale 20,000 tons of non-Bessemer ores were bought for Eastern shipment, to be mixed with native ore in one of the furnaces the boom has called into activity. Plans for ore consumption the coming year contemplate unprecedented shipmnets by the leading interests. In Pittsburg the largest company will handle well above 4,000,000 tons, exclusive of some purchased ores, justifying the estimate of about 2,500,000 tons of billets and finished material.

PIG IRON.—The discussion of the past two weeks has brought the trade nearer to a basis for Bessemer iron for the second half of the year. At last week's meeting of the furnacemen in Cleveland $14.50 was decided upon tentatively as the price, but no sales were made, there being a sentiment among some selling firms that the figure was too low in view of the price of steel and finished material and the level these promised to maintain for the balance of the year. The expectation is that the market will soon be established for the second half, and that considerable transactions will follow. It is probable that further conference among furnacemen will be held within the next day or two. The market for foundry iron has worked itself to a condition that will naturally bring an interval of quieter trading. Foundrymen are supplied for some months ahead, in most cases, and as prices are approaching the summit and furnaces are largely filled up through the third quarter, are not so anxious to provide iron for work they have not yet booked. Furnaces are taking care of their customers, but are not quoting to new buyers, who may have found it necessary to shop around to piece out their supply. There is a gap of more than $1 between certain transactions on the same grades of iron, all depending on the moderation of the seller or the necessities of the buyer. We quote No. 2 foundry at $14.50 to $15 at valley furnace. No transactions in gray forge are reported, but it may be fairly quoted $14 to $14 50 in the valley:

Bessemer	$15 15	Valley Scotch No. 1	$15 90@16 15
No. 1 Strong Foundry	15 65@16 15	Valley Scotch No. 2	15 40@15 65
No. 2 Strong Foundry	15 15@15 65	Gray Forge, valley	14 00@14 50
No. 3 Foundry	14 75@15 00	Lake Superior Charcoal.	15 00@16 00

FINISHED MATERIAL.—The advances have not been so numerous the past week as in some that have preceded; but on material from store sellers are getting steadily higher prices. Mill advances are noted also in some lines. Sheets have been at a stand for the week, the common quotation being 2.50c, Pittsburg, mill for No. 27 common, and 2.60c for material receiving one cold pass. Pipes maintain the new quotation of 60 and five 10's. Tubes are higher, discounts having been lessened by 5 per cent. Merchant steel tubes 2¼ to 5 inches are now 62½ per cent off, with an additional 5 per cent instead of 67½ and 5. Structural material shows fair activity, but the mills are not congested as in other lines. Some bridge work was covered in the past week. We quote beams and channels at 1.40c, Pittsburg, and angles 1.40c, 1.45c and 1.50c, according to size, small angles taking the last named price. The local structural mill is filling old contracts, but is booking no new business. Bar iron is firm at 1.45c, valley mill, and sales at 1.50c, Cleveland are reported. There were large sales by the mills at low prices in the second half of 1898, and there are evidences that not all of these were fully covered by purchases of mill iron and scrap; so that the rolling mills are yet to realize from the apparently prosperous condition of their market.

OLD MATERIAL.—The scrap market has been quite active in the past week. Sales of old iron rails and old steel rails by two local railroads amounted to about 3,000 tons. Mills and foundries are buying from week to week, and dealers in some instances have been able to fix their own prices. The advance in the past week has been about $1 a ton in all leading lines. We quote old iron rails at $19 gross valley mill; old steel rails, $14 gross; old car wheels, $16 gross. No. 1 wrought scrap is quoted $16 to $16.50 net; No. 1 machinery scrap, $12 to $12.50; cast borings, $7.50 to $8; wrought turnings, $10 to $10.50; old iron axles, $19.

CINCINNATI.

March 21.

The week that has just passed has been slightly quieter. Prices are not any less firm, of course, but a great many large buyers have been supplied and then, too, quite a number of buyers have found that they are not able to get iron and have quit for the present hammering at selling agents in the hope of having prices named them. So there has been something of a breathing spell; but it has no particular significance any more than a mere lull in a battle when both sides are still holding their own with absolute confidence. Con-

sumption is going on at an enormous rate. Production is limited and will necessarily be limited for months to come. All the conditions that have made iron scarce are still as much in evidence as ever and promise to make iron stronger. These prices have brought out from their retirement quite a few lots of storage iron and this is practically the only metal to-day which can be secured for prompt shipment. Sales of furnace iron are limited to shipment during the last six months of the year as there is no furnace iron obtainable in the South for shipment before July. In the week Southern irons have sold, gray forge at $10.25, No. 2 foundry, at $11.50 to $12.00, No. 1 foundry, and No. 1 soft, at $12 to $12.50, cash Birmingham. Northern irons have sold at the furnaces —No. 1, $14 50 to $15; No. 2, $14 to $14.50; No. 3, $13.50 to $14. The demand for Lake Superior charcoal irons in the higher grades cannot be met at all, the furnaces are being heavily oversold. The demand for Southern charcoal iron has likewise been beyond supply. There has also been an extraordinary requirement as to silver greys and softeners, and the furnaces manufacturing these grades, both North and South, are unable to meet the demand. In short, there is no class or grade of iron that is obtainable in anything like the quantity that the trade is demanding.

The quotations given below are approximately those of current sales for cash f. o. b. Cincinnati: Southern coke, No. 1 foundry, $14.75 to $15.25; No. 2, $14 25 to $14 75; No. 3, $13.75 to $14 25; No. 4 and gray forge, $14.25 to $13 50; mottled, $13.25 to $13.50; No. 1 soft, $14.75 to $15 25; No 2 soft, $14 25 to $14 75; Lake Superior coke, No. 1, $15.50 to $16.00; Lake Superior coke No. 2, $15.00 to $15.50; Hanging Rock charcoal No. 1, $17 to $18; Jackson Co. silvery No. 1, $16 00 to $16.25; Standard Georgia car wheel, $15.50 to $16.00; Lake Superior charcoal, $16.25 to $16.50.

BUFFALO.

March 21.

The market remains in about the same condition as reported last week, with the exception that foundry iron is ever more scarce. There has been an advance in this class of iron, and what little iron is being offered on the basis mentioned below is being rapidly picked up by buyers who have not yet closed for their requirements. A few inquiries have been received from the larger consumers for delivery during the balance of the year, which indicates a desire to be covered at the present prices. In charcoal iron, one prominent Lake Superior furnace has withdrawn and the market is very firm. We quote for cash f. o. b. cars Buffalo: No. 1 strong foundry coke iron, Lake Superior ore, $15.50; No. 2 strong foundry coke iron, Lake Superior ore, $15; Ohio strong softener, No. 2, $14.50; Jackson county silvery, No. 1, $15.50; Southern soft, No. 1 $16; Southern soft, No. 2, $15.50; Lake Superior charcoal, $14.50 to $15; coke malleable, $15.

PHILADELPHIA.

March 21.

The market for iron and steel shows no reaction, but on the contrary is as strongly aggressive as at any time since the opening of the year. The principle event of the week in finished material was the meeting of the Eastern Bar Iron Association, at which, after years of variance between Eastern and Western lists, the Western schedule of extras and regular sizes was adopted. This gives real uniformity for the first time in years, and establishes a uniform basis that will be especially valuable in connection with the export trade. The new basis really means an advance on certain sizes, for Eastern mills. Three years ago an agreement by both Eastern and Western associations on a National card was formulated, but it was not operative. The general situation in the Eastern iron trade has not changed in the past week, there being agreement on all hands on the proposition that with the amount of business in sight prices cannot recede; and if the spring and early summer demand should be on a scale bearing the customary relation to the business of the winter, further advnces will be justified. Sellers have moved with conservatism thus far and have kept selling because consumers insisted on covering for the latter part of the year. In pig iron the price has now reached a point at which there is more deliberation about buying for future needs. On the other hand furnaces have gone as far as most of them want to, even at the present prices. There is a heavy inquiry for chilled basic pig and Bessemer, but no large sales can be made until some of the idle furnaces resume blast; and very few idle furnaces depending upon smelting Lake Superior ore can resume, owing to the fact that both Bessemer and non-Bessemer ore mines have about contracted all of the ore which can be readily mined and delivered during the coming season. Prices have advanced about $1 a ton over last week. We quote No. 1X foundry at $16.50 to $17; No. 2X foundry at $15.25 to $16; No. 2 plain at $14.75 to $15 and mill iron at $14.75 to $15.25, the demand for the last named, for early delivery, being quite beyond the supply. Scarcity of billets largely precludes transactions. Some small lots have sold at $26.50 and $27 is now the nominal quotation. Mills can get practically their own prices on business for March and April. Bars are higher, and plates are not to be had. Quotations for seaboard deliveries are about as follows: Tank steel plates, 1.90c to 2c; beams and channels, 1.55c, up to 15 inches; angles, 1.55c to 1.60c; refined bars, 1.50c; steel bars, 1.60c.

CONNEAUT DOCK EQUIPMENT.

The Conneaut terminals of the Pittsburg, Bessemer & Lake Erie Railroad have been the scene of important operations the past winter. Large as was the amount of ore handled over the Conneaut docks in the season of 1898, the preparations for the present year's business indicate that the record will be far exceeded. Not to name a definite figure, it may reasonably be expected that the 1899 total will be well above 2,000,000 tons. The most important work of the winter has been the excavation on the east side of the Conneaut river for the new docks over which it is expected the bulk of the direct ore going to Conneaut will be unloaded hereafter. From the Government limit on the lake shore to the bend in the Conneaut River just south of the new dock a V-shaped strip of land has been cut out, requiring the excavation of 125,000 cubic yards. This gives a width of 180 feet at the narrowest point and of 500 feet at the widest point, permitting of speedy turning of the largest vessels that come to the docks. Another piece of excavation was in the railroad yards back of the docks, a cut of 175,000 cubic yards being taken from the hillside, to permit of putting in additional tracks. The channel of the river is now uniformly 20 feet deep opposite the dock space.

The additions to the ore handling equipment, to which previous reference has been made in part in these columns, give the Conneaut docks exceptional facilities. On the old docks, on the west side of the river, are 12 Brown and six King conveyors, and 12 McMyler rapid unloading machines. These are supplemented by 10 revolving derricks of the McMyler type. The equipment installed on the east side of the river for the new docks consists of 12 Brown bridges, a Hulett machine for direct unloading, and 19 McMyler and Excelsior "whirlies." Another addition made to the equipment the past winter is four Thew automatic steam shovels with four-ton buckets, a trial of which in the past few days showed 50 tons of ore handled by one machine in six minutes. The Hulett machine for direct unloading on the new dock is under construction and is expected to be finished by May 1. It is manufactured by the Webster, Camp & Lane Machine Co., of Akron, O. Also located on the east side of the slip, and south of the turn in the Conneaut river, which has been bridged at this point, is a McMyler coal car unloader, installed the past winter. Just south of this is the rail unloading plant. Last year 75,000 tons of steel rails were loaded into vessels at Conneaut. The new equipment for handling rails consists of two 5-ton Excelsior derricks, with which it will be possible to handle 1,500 tons of rails a day. The shifting of cars on the docks is accomplished by the use of a rope haulage system driven by a 600 horse power engine. Electrical equipment is also provided for the electric lights required for night work.

THE Monongahela Steel Co., operating the steel department of the National Tube Works Co., at McKeesport, Pa., has advanced wages 10 per cent. Day laborers get $1.37½ against $1.25 a day.

THE stockholders of the Schultz Bridge Co., Pittsburg, vote on March 23 on a proposition to double the size of their works.

SWEET'S MEASURING MACHINE.

The Sweet's patent measuring machine, an invention of Prof. John E. Sweet, manufactured by the Syracuse Twist Drill Co., Syracuse, N. Y., is guaranteed to measure within a maximum error of a ten-thousanth of an inch, which is sufficiently close for any practical work. The claim that it maintains its accuracy for an indefinite length of time is based on the two features of the ratchet form of measuring screw, and the equal length of thread on screw and nut, as

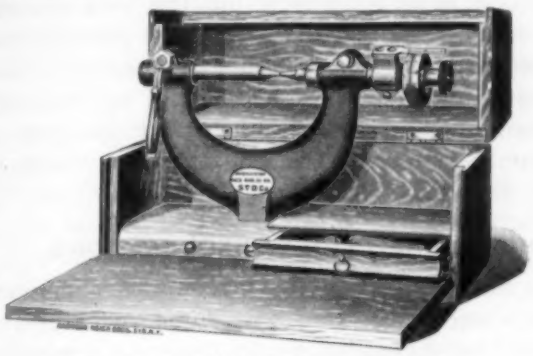

FIG. 1.—SWEET'S MEASURING MACHINE.

shown in the sectional view of the head, Fig. 2. In addition to this there are adjustments and compensations for every possible form of error, not excepting the personal equation, as the spring friction inside the knurled thumb nut regulates the pressure of the measuring points, giving equal results regardless of variations of "touch" of the operators.

The machine is made in the crescent form as shown, in capacities of 4, 6 and 8 inches, also in another form having a straight bar and sliding head of 12 and 24-inch capacities.

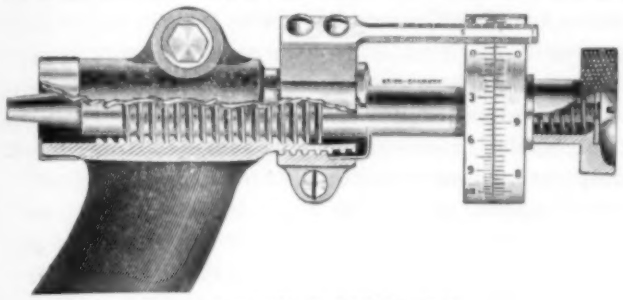

FIG. 2.—SECTION THROUGH HEAD.

The measuring screw has a pitch of ten to the inch, and the graduations read to thousandths; also by an ingenioos contrivance to binary fractions (32ds, 64ths, etc.).

Another form with a vernier attachment reads directly to a ten thousandth. It is also made to read in metric divisions. It is furnished with a box as shown, easily closed up away from dust and danger. The distance pieces and wrench are kept in a small drawer inside the box.

APPLICATION was filed this week for a West Virginia charter for the Chester Rolling Mill Co., which will build a six mill sheet plant at Chester, W. Va., directly across the Ohio River from East Liverpool, O. The principle parties interested are C. W. and J. R. Tindle and W. N. Voegtly, who were connected with the Pittsburg Tin Plate Works. The mills will be arranged in two trains, one train containing a three-high bar mill, with two roughing and three finishing stands, the other containing one roughing and three finishing, and two stands of cold rolls. The capitalization will be $250,000. The property is advantageously located on the water font, and considerrable material will be received and shipped by water. The branch from the Pan Handle near Steubenville, running up the Ohio River, will be extended four miles, in order to reach Chester, and this work will be completed by Aug. 1. The parties have an office at 309 Ferguson Building, Pttsburg. The first contracts, for the mills and buildings, are to be let this week.

THE steel steamship M. A. Hanna, built by the Globe Iron Works Co., for the Cleveland Steamship Co., will be launched Saturday afternoon, March 25, at 2:30.

PERSONAL.

J. P. Miller, who was connected with the Carrie Furnace when operated by the Carrie Furnace Co., Pittsburg, has returned from Mariopol, Russia, where for nine or ten months he was manager of the Mariopol-Nicopol Mining & Metallurgical Co.'s blast furnace. Mr. Miller was not pleased with the conditions and resigned. He states pig iron was selling when he left at $26 a ton, and laborers were getting from 20 to 30 cents a day. He expects in a short time to go to Japan to manage a blast furnace which is being built there by American capital.

James W. Reis has been appointed manager of the New Castle works of the National Steel Co., at New Castle, Pa.

William B. Middleton, general manager of the Taylor Steel & Iron Co., of High Bridge, N. J., died March 10 at the New York Hospital, New York.

John Reis, manager of the Edith and Rosena furnaces when the two were operated by the Oliver & Snyder Steel Co., has been made general furnace manager of the National Steel Co.

O. P. Letchworth, of the Pratt & Letchworth Co., Buffalo, who has been elected president of the National Founders' Association, began as an office boy in the 'sixties with a saddlery manufacturing firm in Auburn, N. Y. He was admitted in 1873 to partnership in the firm, which became Hayden, Letchworth & Smith. In 1876 he went to Buffalo, entering the employ of Pratt & Letchworth, manufacturers of mallealbe iron and steel castings. Serving successively as clerk, salesman, purchasing agent and general manager, he was made a partner in 1886, on the death of his father. In 1896 a stock company was formed and Mr. Letchworth became its president. Referring to Mr. Letchworth's equipment for the presidency of the National Founders' Association *Foundry* says: "It argues well for the association's views that it has chosen as its head one who has always recognized that the employe has certain rights, as well as the employer, and who has shown himself to be made of the right material to take a firm stand always on the side of justice and equity and as opposed to oppression or coercion by either party."

Tennessee Coal, Iron and Railroad Co.

The stockholders of the Tennessee Coal, Iron & Railroad Co. met at Tracy City, Tenn., March 15, in annual session. The following directors were elected: James T. Woodward; W. S. Grunee, Jr., E. R. Chapman, Oliver Payne, J. G. Moore, C. M. McGhee, A. D. Broadman, B. F. Tracy, Cord Meyer, David J. McCombes, New York; A. T. Smythe, Charleston; William Barbour, Boston; James Henry Smith, Boston; N. Baxter, A. M. Shook, Nashville; James Bowron, Birmingham. President Baxter's annual report showed the company to be in good condition, with brighter prospects than ever.

The retiring directors are C. M. McGhee, of Knoxville, and John B. Adger, of Charleston, S. C., who are succeeded by Messrs. Barbour and Smith.

The company's income account for 1898 showed a surplus over charges, of $223,152, the balance sheet, as compared with that of a year previous is:

Assets:	1898.	1897.
Land Account	$20,703,254	$20,704,664
Permanent investments	9,240,923	9,242,354
Temporary investments	121,257	23,907
Treasury bonds	329,000	315,500
Sundry debtors	891,907	896,153
Inventory account	604,001	662,974
Cash items	181,984	119,571
Suspense account	254,413	115,615
Profit and loss	.....	127,923
Total	$32,386,741	$32,202,666
Liabilities:		
Capital stock	$21,000,000	$21,000,000
Bonded debt, net	9,179,997	9,299,169
Bills payable	958,051	963,207
Accrued interest not due	203,061	205,479
Sundry creditors	874,841	665,648
Reserve funds	66,417	62,883
Outstanding orders	7,320	6,277
Profit and loss	97,051	.....
Total	$32,386,741	$32,202,666

The company's liabilities are in excess of those of last year by over $200,000 in open accounts. Most of this is represented among the assets by "suspense accounts," amounting to not far short of $300,000. A year ago these "suspense accounts" were a little over $100,000, which was an increase on the previous year. The character of these accounts is of some interest. The recent rapid advances in iron will make in time a very good showing in the financial statement, and that for 1899 will undoubtedly prove to be the best in the company's history.

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AND
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MARCH 23, 1899.

EVEN STEP IN WAGES AND PRICES.

The result of the recent canvass of the shipments of the Mahoning Valley rolling mills to determine whether an advance in wages is due under the scale, is instructive. The announcement of advancing prices week by week is received by employees as proof that better wages can be paid. But the examination of the manufacturers' sales books and of the rates at which shipments in the past two months were billed showed that the new prices are applicable to the merest fraction of recent output. Old contracts at low prices cover almost the entire tonnage now going from the mills, and it will be easily two months more, possibly longer, before the one-tenth increase necessary to advance puddling 25 cents a ton will be reached in the average price of material shipped from the mills in the period in question. What the representatives of the workmen have found out by an inspection of the books should suggest to employes in other lines that the condition existing in the bar iron trade is not exceptional. There have been sales of $25 billets at Pittsburg, but steel works are delivering $15 to $16 steel week by week, and comparatively little will be shipped from steel plants in the next three months that sold above $16.

There is a similar condition in foundries. The old low-priced contracts are still on hand, but demands are coming in for 10 per cent advances, effective immediately. And here and there a foundry that did not fully cover its contracts with purchases of pig iron has paid a higher price for the additional purchases of the latter made since the rise began. The Lake Superior iron ore producer, unfortunate beyond any of the others named, must wait a year before he can get the benefit of the prosperity that is now under full swing; and mayhap by that time the unexpected will have happened, and the aspect of things will be so changed that his price for 1900 will be in accord with the less promising future. Yet a demand is pending for an advance in wages at prominent properties, and organizers have been brought into the Lake Superior country to persuade the men that it must be enforced.

When increased prices come to the maufacturer, the wage earner should have his share. We have always advocated the sliding scale, within reasonable limits, as a basis for wages; but the very essence of the sliding scale theory is that one scale should not slide upward while the other is stationary. The questions involved in wage demands are certainly important enough to warrant careful investigation; to jump at conclusions is folly that may lead to serious disaster.

INDIVIDUALITY IN CONSOLIDATIONS.

It is not safe to generalize about consolidations. In their beginnings they have so many features in common that the tendency is to lump them together in a class, and to apply to one the statements as to overvaluations, methods of controlling production and markets, and expedients for interesting the speculative public, that may be applied to another. But there are differences that date from the day of organization — back of organization, indeed; they inhere in the original companies. Among the five more conspicuous consolidations in iron and steel there are differences in managing personnel, in the character and efficiency of plants, in strength of organization, in methods of doing business, and in attitude toward stock manipulation, that promise to be more and more marked as time passes. It will be interesting, viewing them merely from the standpoint of stock quotations, to note the divergence that will appear at the end of 12 months. Even so short a period will give abundant opportunity for mistakes in business policy—opportunity that will be embraced in the one case and carefully avoided in the other. It will not be long before an individuality of management will be established, and the careful student of the trade will be able to characterize the various organizations according to the traits they have developed. Those composed in part of original dividend-paying companies and in part of companies whose dividends were conspicuous for their rarity may be expected to make a different record from those whose original units were known to be all money-makers. The management that brings to the new problems of consolidated operation the experience of successful careers in charge of single interests, has far better promise of success in the large field than one that is hobbled by a doubtful record.

One thing is to be set down to the good, in casting up the benefits and evils of the consolidation. That is the standardizing of practice, which will be the most marked characteristic of the combinations, on the side of technical progress. While in general there are no great secrets connected with the management of blast furnaces or steel works in the United States, it is evident that the aggregate efficiency of the plants brought together in the last consolidation in the Central Western iron trade will be much enhanced by putting their operation under the supervision of one master of practice. In the

operation of blast furnaces, item by item—fuel consumption, making of mixtures, handling of stock, efficiency of power, details of blast pressure, temperature, etc.—all gathered from a dozen plants will be subjected to scrutiny, and the best in each particular made the standard to which all must work. Excellent opportunity will be afforded for studying the relative economies, for example, of large and moderate-sized stocks. The improvements introduced at individual plants in the past six years, a period of the most intense competition and of striving for savings in production, will now be common stock, and the best will survive. The developments in this direction, in view of the fact that iron manufacture has been thus far a stranger to the trust method as a maker of practice, will prove the most instructive result of the new regime, and will be studied with interest.

It is a strong guaranty of the success of certain of the iron trade consolidations that their promoters have had the sagacity to pick for positions of largest responsibility men conspicuous for technical and commercial ability as heads of constituent plants. When such men cast their fortunes with the new companies, there is assurance that the old-time way of making dividends by prudent, progressive management will not be abandoned for the methods of the street. Companies with such leadership have not figured in "inside pools" for the marketing of their stock. Their officers and employes have been well occupied in these days of beginnings, in meeting the administrative problems that have almost appalled by their magnitude. It need not be said that when the sifting process comes, in the second or third stage of the concentration movement, the companies so manned will be surest to stand the test.

THE PEOPLE'S PURCHASING POWER.

It would be difficult to compute the tremendous support given to the advances in iron and steel prices, by the upward movement in wages in various industries. True, the advances in products brought about the advances in wages in iron and related industries; but there is a mighty reciprocating movement of wages and market prices. Through it an increased purchasing power of the people prevents higher prices of commodities from checking consumption. Higher wages for Connellsville coke workers were a prime factor in the advance in iron in the spring of 1895, and iron workers' wages went up soon after; but the iron industry, though vast, was not sufficient of itself to lift and sustain prices, since wages in other lines were at a standstill, if not declining; and the boom ended in disaster. It is fortunate that recent advances in wire, nails, tin plate, in stoves and various hardware products, find the purchasing power of the people greatly enhanced by many months of steady employment by the artisan class, by two years of remunerative labor by the farmer, and now by advances in wages affecting tens of thousands in all parts of the country. Those who have been asking anxiously whether the present level of prosperity prices will keep up, may find in the great increase of the people's ability to buy a strong indication that for 1899, at least, there will not be any sharp check upon buying, due to rising values.

THE production of Bessemer steel in Great Britain in 1898 amounted to 1,759,386 tons of ingots, against 1,884,155 tons in 1897—a falling off of 124,769 tons. The decrease is plainly due to the success of American rail makers in increasing their export trade and to a corresponding falling off in the export shipment of British Bessemer rails. Against the record above is to be set the advance in Bessemer steel production in the United States from 5,475,315 gross tons in 1897 to 6,609,017 tons in 1898. The British Iron Trade Association has also collected recently the statistics of open-hearth steel production, showing 2,806,600 tons in 1898—a gain of 204,794 tons over the preceding year. Of the total, 2,590,512 tons was acid and only 216,088 tons, basic. In the United States the preponderance is reversed.

THE CONSOLIDATIONS.

Western Rolling Mills.

The movement to consolidate Western and Southern rolling mills has made headway in the past week, and nearly all the necessary options have been secured. Less outside money will be invested, proportionately, than in other recent iron and steel combines. The promoters announce that organization will probably be effected within the next two weeks. The capital proposed is $15,000,000 and 36 Western mills, large and small, fit and unfit, are included in the plan. Chicago and Cleveland are both discussed as probable headquarters.

Wrought Pipe and Tube Works.

Negotiations for the merging of the wrought pipe works of the country in the National Tube Co., which is to be a New Jersey organization, with $60,000,000 capital, half of it 7 per cent preferred, have been making headway the past week. Options have been taken on most of the plants, and will be secured soon, it is expected, in the case of the others.

The meeting of stockholders of the Riverside Iron Works, of Wheeling, W. Va., held March 16, decided to give an option to the promoters of the National Tube Co., the new consolidated company. The consideration, in cash and stock of the new company is understood to be about $6,000,000. Many of the stockholders will take cash. It is understood that General Manager Hearne and Secretary Culbertson will be active in the consolidated company. The terms of the transfer are said to be two shares of the consolidation's 7 per cent preferred stock and one share of common stock for each share of Riverside stock, or, if cash is desired, $2 for every dollar's worth of Riverside stock. In addition a 15 per cent dividend goes to the Riverside stockholders from the $450,000 surplus fund, now on hand.

Sheet Manufacturers' Combination.

The committee of the sheet manufacturers association which has been at work on the project of acquiring the plants of all the manufacturers by a corporation with $50,000,000 capital, has been co-operating with Judge W. H. Moore in the preliminaries. It is expected an application will soon be made for a charter. The company will be controlled by the interests for which the National Steel Co. and the American Tin Plate Co. stand and will work in harmony with them.

THERE was added to the American Pig Iron Storage Warrant Co. stocks in the 10 days ending March 20, 900 tons, and in the same time 5,400 tons was withdrawn, leaving stocks on March 20, of 116,400 tons.

THE Cleveland Crane & Car Co., recently formed, succeeds to the crane business of the Phœnix Iron Works Co. and of the Cleveland Punch & Shear Works. The old Phœnix plant, Wason st. and the C. & P. Road, Cleveland, is occupied by the company.

RECEIVED FROM THE TRADE.

Recent literature of the Semet-Solvay Co., Syracuse, N. Y, includes a pamphlet reprint of the paper of Wm. H. Blauvelt, before the Buffalo meeting of the American Institute of Mining Engineers, as already given in these columns, and a pamphlet entitled "Retort Coke Ovens, with Recovery of By-Products." The latter gives views of the more recently constructed Semet-Solvay coking plants, with a list of ovens of this type erected in other countries. The latter number 1,514, of which Belgium has the largest number, 579. The claim is made that "under favorable conditions the retort coke ovens will decrease the cost of coke and consequently the cost of iron, from 50 cents to $1 a ton."

We have referred to the starting up of the Grant Machine Tool Works, of Cleveland, to manufacture a new line of machine tools. The first catalogue of the company has just been issued, giving half-tone views and details of the tools as designed by John J. Grant. Some departures from precedent have been made in the frame, and some improvements in usual design and operation of working parts. Thus far the line consists of a 12-inch swing hand lathe, in two lengths of bed; a 26-inch semi-radial drill and boring mill; a piston-ring and cylinder-head turning machine; No. 2 plain milling machine with rack or screw feed; No. 3 plain milling machine. Other specialties are Grant's friction pulley, milling machine vise, and casting mold for Babbitt driving blocks. The Grant Ball Co.'s line of steel balls, manufactured at the same plant, is also described.

Valves form the chief subject matter of the 1899 catalogue of the Jenkins Bros., 71 John st., New York. Improvements have been made upon these products from time to time. The company's iron body valves have been improved by increasing the thickness of flanges, and adding more bolts, making them suitable for high or low steam pressure. The Jenkins discs and the Jenkins standard packing have also been improved. The catalogue is fully illustrated, and a strong guaranty is given concerning the service of the company's products.

Catalogue C, of Dietz, Schumacher & Boye, of Cincinnati, gives a cut of this firm's new building recently occupied, and a general description of its lathes, drills, shapers, and screw machines. A separate pamphlet is devoted to the company's double-spindle, triple geared engine lathe, which for some lines of work is equivalent to two lathes, with wide range of speed and feed.

Late publications of the Joseph Dixon Crucible Co. are No. 4, vol. 1, of its four-page monthly paper, *Graphite* and "Dixon's Teachers' Note Book," which tells about pencils and incidentally bristles with bright things.

Pennsylvania Steel Co.

The annual meeting of stockholders of the Pennsylvania Steel Co., in Philadelphia, March 14. The report of the board of directors covered the operations of the company's works at Steelton, Pa., and Sparrow's Point, Md., for the calendar year ending Dec. 31, 1898. It showed that there had been a remarkable revival in business, especially during the latter part of the year. The prices for the product of the two plants were the lowest ever received. The statement was made that the company had diversified its product to meet the increasing demand for the great variety of uses for which steel is now being used, especially for open-hearth steel. Several new furnaces have been built to make this product and extensive improvements were made to the Steelton works.

The financial statement showed a profit for the operations of the Steelton plant, after taking out the cost of the extensive improvements and paying all interest charges of $313,912.42, against a loss in 1897, of $124,650. The Maryland plant showed a loss of $262,893.62, after taking out the great cost of repairs and maintenance and a much larger interest charge. Thus the net profit was $51,009. The annual election resulted in the choice of Edgar C. Felton, Luther S. Bent, Effingham B. Morris, F. W. Hunnewell, John Cassells, George Wood, C. Stuart Patterson, Evans R. Dick, William D. Winsor. In all 37,960 shares were voted.

The report of production showed that the output of the Pennsylvania Steel Co. of pig iron and spiegeleisen increased from 85,000 tons in 1896 to 137,000 tons in 1897 and 246,000 tons in 1898. The production of steel ingots rose from 200,000 to 259,000 and 340,000 tons respectively, while that of steel rails developed from 69,000 tons to 110,000 and to 132,000 tons. In 1898 the average price of rails was $1.92 less than in 1897, while the price of billets and slabs was greater by 66½ cents in 1898 than in 1897. The Sparrow's Point furnaces made in 1898 138,000 tons of pig iron, and the rolling mills produced 138 000 tons of rails and 10,000 tons of billets and other products. During 1898 the Sparrow's Point works were placed in first-class order and the shipbuilding plant was started up. The company have several large vessels to build, some being for the United States government and a few for private corporations.

Announcement is made of an addition of six new 50-ton furnaces to the open-hearth department and additional soaking pit furnaces. Large cranes will be built for the handling of rails in the yard. A number of departments will be enlarged shortly. There are 6,000 men now at work, a gain of 2,000 over February, 1898.

Empire Iron and Steel Co.

Rogers, Brown & Co. and Moore & Schley, the New York bankers, are reported to be the leading interests in the Empire Iron & Steel Co., incorporated in New Jersey, last week with $2,500,000 of 6 per cent cumulative preferred stock and $2,500,000 of common stock. The securities will not be on the market. It is the expectation that several idle furnaces will be acquired and put in blast, including Bellefonte furnace, formerly run by the Valentine Iron Co., at Bellefont, Pa., and the Greensboro, N. C., furnace. Walter Kennedy of Pittsburg, is now at Bellefonte, getting the furnace there in order. Local ore will be used in large part. Some improvements will be required and it will be several weeks before a start can be made. Advices from Greensboro, N. C., are that the Greensboro Furnace Co.'s stack was sold by Wharton & McAlister to the Empire Iron & Steel Co. for $65,000, and that arrangements are being made to put the furnace in blast. It was built in 1892 but has never been operated.

In this connection the following from Rogers, Brown & Co.'s New York market report is of interest: "The closest attention is paid to efforts that are now general over the country to start up idle plants. The results, it must be admitted, are disappointing. There are plenty of furnaces and penty of money to operate them, but nearly all are debarred by the practical difficulties of getting together material. In one district it is coke, in another district, ore. The earliest promise of relief appears to be in Virginia and Eastern Pennsylvania, but so far the progress has been very disappointing. By mid-summer there will be three or four furnaces in Central and Eastern Pennsylvania added to the active list, and two or three in the Virginia district. That is about the limit of expansion for six or eight months."

Industrial Notes.

The Sharpsville Foundry at Sharpsville, Pa., was sold by the receiver last week, to James V Rose, of Sharon, Pa., for $2,900. The purchaser will have improvements added and will put the plant in operation within 30 days.

Young Brothers, composed of Charles A. and George A. Young, 320 to 326 Atwater st., Detroit, coppersmiths and sheet iron workers, are so full of orders that overtime work is necessary. Their line comprises special copper work for chemical laboratories and drug manufacturers, copper pipes, stills and kettles, engine oilers, etc., marine work of all kinds, smoke stacks, and breechings, exhaust and blow piping, exhaust heads and metal roofing. A large contract for coal tanks for mechanical stokers at the Michigan Alkali, Co.'s plant has just been executed. Another important piece of work now completed is a large copper steam pan with mixing attachment made for the Michigan Drug Co. With a good line of orders on their books, which means several months work ahead, and many new inquiries coming in, the indications are that this firm will be compelled to enlarge still further its plant and facilities.

Black & Gloninger, of Pittsburg, sold a 15-acre tract at Glassport, above McKeesport, last week, to a company which will erect a foundry and machine shop. The name has not been given out as yet.

THE MACHINERY SALESMAN'S EQUIPMENT.

In his comments on the functions of the machinery agency and its relation to the machinery manufacturer, our contributor "Scrutator" has had something to say about the limitations of the machinery salesman, who represents a selling firm rather than the manufacturer. In this connection the following from the *American Machinist* is interesting as illustrating the important mission of a salesman who represents a high type of talent, whether measured by mechanical or commercial standards:

We have always believed that no man can be too good a mechanic to be a salesman of machinery, and that one who is not more or less a mechanic is wofully out of place in such business. It is doubtful even if the mechanic that is required for selling machine tools can be produced by any process of education and training alone. He must be a mechanic by birth and instinct and impulse. No amount of bragging about how excellently a machine is made, or what an amount of work it can do, really counts for much in the selling of machinery. The question in either the buying or the selling of machinery is rarely one of strength or endurance, but almost entirely that of adaptation. The machinery salesman is not, at his best, an *ex parte* pleader, but much more a judge or an arbitrator. It is fully as necessary for him to know and understand the other side as his own side. The machinery that he sells must give satisfaction, or his sales will cease. His line of machinery, or his special machine, must continue to improve, to enable it to hold its own against its alert competitors, and the salesman more than any other living man is in the position to know all the conditions under which it must work, how completely it satisfies those conditions, and what opportunities, both special and general, there are for adding to its efficiency by change in details of construction or in mode of operation. And being in the position to know these things he is also in position to communicate them, and his suggestions should be expected and should never be disregarded.

A man of high standing as a salesman in this larger sense has just passed away. We have received a number of letters from those who at different times had been associated with the late George A. Barnard, all in high terms of appreciation and regard. In one of these letters the writer speaks of Mr. Barnard as "an exceptionally efficient salesman." The words of another correspondent, which we here quote, might be taken as an interpretation or an amplification of those quoted above.

"He was a man of the strictest integrity of purpose, most enthusiastic in his business, and thoroughly believed all he said without a thought of deception. In my opinion he has done more to advance the stationary engine to its present standing than any other one man. The greater part of his life was devoted to the sale of steam engines, giving him the best opportunity to discover the good and the bad of every engine, and permitting him to take advantage of such information."

Here is the nearly ideal salesman embodied. The improvement of the steam engine which has gone on so rapidly for a third of a century, both in its increased efficiency and its wider adaptability, but especially in the latter, and more particularly in connection with electric service and the satisfactory governing of the engine, is here sufficiently accounted for. In bringing the engine performance to its present satisfactory standard the other necessary qualification of the seller is in full evidence. The habit of insisting upon securing the best results obtainable is quite as important as that of perceiving the possibilities of the case. It has been the present writer's lot more than once to have had to look out at the salesman or traveling representative from the inside of the shop whose product he represented, and we happen to know what a benign effect the "kicker" salesman has exercised. The feeling in the shop has been that if he was satisfied there was no fear of the customer.

Whatever such men as Mr. Barnard have done for the steam engine others are doing for the various machine tools. The opportunities and the responsibilities of these latter are greater than those of the steam engine men, because the standards of performance are not so fixed and because the end of the process of development is not apparently so nearly reached.

The true salesman, then, is working in the interest of all parties, and is to be welcomed and encouraged and consulted with mutual profit. For the man whose sole function is to take orders, who has no suggestions as to how the machines are to be used and no curiosity to see them in use, on the one hand, and no suggestions as to how they are to be built and improved on the other, we have not a word, and for the firm that employs him we have little hope.

MR. SWANK ON THE OUTLOOK.

In response to questions from its Editor, the London *Iron and Coal Trades Review* has the following from General Manager Swank concerning the condition and prospects of the iron trade of the United States:

You ask whether the existing prices of iron and steel in the United States will be increased. It is dangerous to hazard a reply to this question, but I will venture the opinion that we have already in most lines, and probably in all lines, come very near to the highest prices that may be looked for this year. While many reasons might be given for this opinion, including the inevitable reaction that is sure to come from the extraordinary stock speculation of the last few weeks, which has had a stimulating effect on the general industrial situation, the principal reason that influences my opinion is the fact that in all iron and steel lines, without exception, we have a greater producing capacity than will be required to meet any possible demand that may exist this year. To illustrate: in publishing a few weeks ago the details of our production of 11,773,934 tons of pig iron in 1898 I said that, "taking a survey of the whole field and eliminating all furnaces that are never likely to run again, we estimate the actual idle furnace capacity of the country to-day at 4,500,000 tons per annum, of which probably 2,500,000 tons will be available in the next six months if there should be an extraordinary demand for pig iron." These words were written in January, and our weekly production of pig iron has not since increased. The consolidations of manufacturing companies that have taken place in this country during the last few months have had for a leading object the checking of ruinous competition, which only an excess of capacity could have produced.

In answer to your second interrogatory, as to the extent of the producing capacity, I think that, with a producing capacity in excess of our wants, which we will fully supply, and with prices but little, if any, higher than they are now, we are likely to seek foreign markets for the sale of a constantly growing percentage of our production. More specifically stated, we are likely to produce a considerable surplus of iron and steel for export, because our prices have not yet advanced so far as to operate as a check to our export trade, which our manufacturers have been industriously cultivating.

Your third interrogatory asks whether our existing resources of production are likely to be largely increased within a reasonable period. A correct answer to this question depends, of course, upon the continuance of the present active home demand for iron and steel. I think that this demand is likely to be maintained throughout this year, increasing perhaps in certain lines, but beyond the present year it would be unwise to indulge in speculation. At present our industrial sky is bright, but our political sky is not, and the one may cloud the other next year, when we are certain to have a most exciting Presidential and Congressional campaign. To day our horn is exalted. Our iron and steel industries are most active.

Answering your fourth interrogatory, if there should be a demand for iron and steel beyond that which now exists, our already developed resources in raw materials and in manufacturing plants are abundantly able to meet it. There are absolutely no obstacles to an immediate increase in our production of iron and steel. We have iron ore and coal in abundance, with mines already opened and coking ovens already built that will meet any possible demand, and we have blast furnaces, rolling mills, steel works, wire mills, tin plate works, foundries, and machine shops galore—all of the latest and best types. The boom in our iron trade in 1879 and 1880 found us wholly unprepared to meet it; the boom of 1898 and 1899 finds us fully prepared at every point."

ALICE Furnace, at Sharpsville, Pa., was blown in March 17, after extensive repairs.

Wire Gauges.—I.*

BY S. H. STUPAKOFF.

Wire gauges are used throughout the civilized world. They indicate certain series of dimensions which are used for determining the size of a material by number. They find their most extensive application in the metal trades for gauging the thickness of sheets and the diameters of wires. A gauge number represents, without exception, a certain invariable dimension. A series of such dimensions is called a standard gauge, which generally bears the name of the originator, or describes the purpose for which it is intended. Manufacturers of certain classes of materials originally selected such series of dimensions as corresponded with their products, numbered the same from 0 or 1 upwards and called it their standard. These standards were sometimes adopted generally, while in many cases others which suited the fancy of their originators better were introduced also.

There was never any system recognizable in the progression of sizes for the gauge numbers until Brown & Sharpe, of Providence, R. I., took the matter up and established the "B. & S.," or American Standard Wire Gauge, which was adopted and recommended by the Franklin Institute. The sizes in this gauge advance by geometrical progression, while in all others the dimensions advance in irregular steps. Though this is not the only gauge in use in this country, it rightly deserves the most prominent place in the following list:

1. Brown & Sharpe, or United States Standard Wire Gauge.
2. Birmingham Wire Gauge.
3. United States Standard Gauge for Plates.
4. Stubs' Steel Wire Gauge.
5. Morse Twist Drill Gauge.
6. Steel Music Wire Gauge.
7. American Standard Screw Gauge.
8. Roeblings' Wire Gauge.
9. Washburn & Moen's Wire Gauge.
10. Trenton Iron Co.'s Wire Gauge.
11. Edison Wire Gauge.

The above represent a few of the numerous gauges used in the United States, the first seven of these being in almost daily use in most of our larger manufacturing establishments. Other gauges, which have been established by several large manufacturers of wire, sheet, hoop iron, etc., are occasionally adhered to, but their use is gradually falling off. The following list, which gives some of the principal gauges used in England, will show how much our practice varies from that followed in other countries:

1. British Legal Standard Gauge.
2. Birmingham Wire Gauge.
3. Birmingham Sheet Metal Gauge.
4. Whitworth Wire Gauge.
5. Warrington Wire Gauge.
6. Lancashire Gauge for Round and Pinion Wire
7. Sheet and Hoop Iron Gauge.
8. English Zinc Gauge.
9. Birmingham Gauge for Silver and Gold.

The French Decimal (Limoges) gauge is used extensively in several countries, though not to the exclusion of others. Steel, iron, and brass wire, as well as sheets, are generally drawn and rolled, respectively, to the Birmingham wire gauge; copper, German silver and platinum to the "B. & S.," or B. W. gauge; steel drill rods to the Stubs' steel wire gauge and steel music wire to the Steel Music Wire gauge.

The United States Standard gauge for sheet metal and plate iron and steel was established by Act of Congress, passing both houses on March 3, 1893. It went into force on the first day of July, 1893. It was subsequently adopted as standard by the American Railway Master Mechanics' Association and by the Association of American Steel Manufacturers. This gauge for plates has as its base the weight of sheet iron per square foot. One cubic foot of iron weighing 480 lbs. will make one square foot ½ inch thick weigh 20 lbs. or 320 oz. This represents the largest number (7-0) of the gauge. The smaller numbers are subdivisions thereof and decrease in weight 20 oz. each from No. 7-0 to No. 1, 10 oz. each from No. 1 to No. 14, 5 oz. each Nos. 15 and 16; 4 oz. each Nos. 17 to 20, 2 oz. each Nos. 21 to 26; 1 oz. each Nos. 27 to 31, ½ oz. each Nos. 32 to 36 and ¼ oz. each Nos. 37 and 38; the last and smallest number weighing 4 oz. per square foot.

The divisions of the American or Brown & Sharpe wire gauge increase, as mentioned above, in regular geometrical progression. No. 4-0 being taken as the largest number, measures .46 inch. Deducting from this value 10.9478 per cent, the next smaller number is found; and so on, each number decreasing in the same percentage, until No. 36 is reached, which measures .005 inch. It might be mentioned here that the number 36 on the B. & S. gauge corresponds exactly to No. 35 B. W. gauge. This process of substracting the above stated percentage from the larger number in order to find the next size smaller one is the same as multiplying the smaller one by .890522 in order to find the next larger one.

The American Standard screw gauge is used for determining by number the various sizes of wood screws and machine screws. The difference between consecutive sizes is .01316 inch. No. 26 of this gauge is 4-10 of an inch. It decreases to .03152 inch in No. 3-0 and it increases to .71584 in No. 50. The larger numbers, however, are very rarely if ever used in ordinary practice.

Oldest and Best Known Gauge.

The Birmingham wire gauge has the merit of being the oldest and best known gauge for wire and sheet metal. In 1843 Mr. Holtzapffel carefully measured and determined a series of numbers ranging from .454 to .004 inch. These were published by him in 1847 and were subsequently adopted by the standard department of the Board of Trade.

The Whitworth standard wire gauge ranges from 1-1000 to ½ inch and comprises 62 measurements. All numbers of this gauge express at the same time the thickness in 1000ths of an inch. The smallest number is No. 1, which measures 1-1000 inch. The intervals between Nos. 1 and 20 are 1-1000 inch each; between Nos. 20 and 40, 2-1000 of an inch each; between 40 and 100, 5-1000 inch each; between Nos. 100 and 120, 10-1000 inch each; between Nos. 120 and 180, 15-1000 inch each; between Nos. 180 and 300, 20-1000 of an inch each, and between 300 and 500, 25-1000 of an inch each. Though the numbers in this gauge do not advance consecutively, it has the undoubted advantage over all the others, in that the actual measurements of all numbers are indicated in each instance by the number itself.

The British legal standard gauge, as recommended by the Standard department of the British Board of Trade, was introduced in Great Britain on August 23, 1883, by order of Council, and it went into effect March 1, 1884. It took the place of the Birmingham Wire Gauge, which formerly enjoyed a universal use in England. Among other gauges not enumerated in the two lists given above may be mentioned: G. W. Prentiss wire gauge, Russian sheet iron gauge, galvanized iron gauge, American gauge for sheet zinc, Belgian (Vielle-Montagne) sheet zinc gauge, rifle bore gauge, needle gauge (for needle wire).

Form and Material of Gauges.

Most gauges in common use are made of a piece of sheet steel, either circular or rectangular in shape, which is provided with notches of consecutive dimensions corresponding to the respective standards they represent. A slight deviation from these shapes is represented by the new United States Standard gauge for plates, one form of which is oval. A few gauges are provided with circular holes in place of the notches just mentioned, and among these the most commonly known are the Standard twist drill gauge and Steel Wire gauges. Other makes represent an angular slot, the edges of which are provided with suitable divisions; and a fourth kind, which is used exceptionally for gauging holes—and therefore does not belong to the *wire* gauges proper—is made in the shape of a tapering strip of metal, the face of which is, like in the preceding group, provided with divisions and numbers, indicating standard measurements or dimensions and numbers of standard gauges.

The notched gauges of these groups appear at first sight to have the advantage of giving fixed dimensions for all of the respective numbers of the various standards they represent.

* Read before the German Engineers' Society, Pittsburg, Pa., March, 22, 1899.

They are certainly made use of readily, even by the most ignorant workman. But, while they may answer the purpose of approximating the thickness of material by numbers, they are by no means reliable tools when it is necessary to determine dimensions of materials with precision. Their shape makes it almost commercially impossible to obtain a number of these gauges of exactly the same size, and, in spite of the greatest care taken in the various stages of their manufacture, the widths of the slots will vary more or less in all. We will have to fall back on adjustable gauges if we want to obtain correct dimensions, as with their aid accurate readings can be obtained in fractions of any of the adopted standard units of measurements.

Variations in Gauges.

This question has been treated in plain and comprehensive language by Messrs. Miller, Metcalf & Parkin in their memorandum on gauges, a reprint of which is given in the well known catalogue of the Brown & Sharpe Mfg. Co. They say:

"Referring to the annexed tables, we would call attention to some of the absurdities and anomalies of the present system of gauges, denoted by numbers. A perusal of these tables should satisfy us that we have a sufficient variety to choose from, and ample refinement, when we get down to one-millionth of an inch, which is the final figure in some cases. In some cases the difference between two numbers falls as low as two one-thousandths of an inch; in others it is only one one-thousandth, etc. It may be possible to make one gauge to any of these standards, which shall be so accurate as to defy the detection of an error; and with the same care it may be possible to make a thousand such gauges. But every mechanic, and every person accustomed to making accurate measurements of the best work, knows that it is simply impossible to obtain absolute accuracy in such pieces of work when produced in large quantities. It is impossible commercially, on account of the cost, and that settles the question.

"Every one knows of the wonderful accuracy of the Whitworth gauges and also their enormous price, which makes them almost unsalable. In regard to ordinary wire gauges, they are notoriously inaccurate because they cannot be made accurate and be at all salable. We have two new gauges in our possession, which were kept in our offices for purposes of comparison, and to prevent their wearing they were not allowed to go into the mills. In a recent case a sample under discussion measured on one gauge tight 23, and on the other light 24, and our customer said it was neither by his gauge, and did not suit him anyhow. One of our new gauges has its No. 22 so much larger than its No. 22 that the difference can be easily detected by the naked eye; yet No. 23 ought to be two to four thousandths* smaller than No. 22. If we were to roll No. 23 by that gauge, how would our customer get what he wanted, unless his gauge accidentally contained the same blunder? Yet our gauge is a new one, stamped with the maker's name, and cost about $6.

"Another trouble is with the wearing of the gauges, for which there is no remedy; and we imagine that no man ever throws away a gauge because it is worn out. On the contrary, it represents an outlay of $6; he is used to it; he measures everything by it; and he is mad when anything does not measure to suit it. A still more serious difficulty arises from a very common mode of ordering. We frequently have orders for such a gauge as 'light' or 'tight,' 'full' or 'scant,' 'heavy' or 'easy;' or such a number and one-half, for instance, 15½. This latter is terribly confusing to a roller. He almost always takes it to mean that it is to be thicker than the whole number, and is pretty certain to make it 14½ for 15½ if he is not warned beforehand. Then in regard to the terms 'light,' 'easy,' etc., we have, for instance, the difference between Nos. 27 and 28 in the three systems, as follows:

.00225, .002, .001554,

or two hundred and twenty-five one-hundred-thousandths, two one-thousandths, and fifteen hundred and fifty-four millionths.

"How is it possible for a roller to know just how many millionths of an inch another man, whom he never saw, means when he says, No. 28 'full,' or No. 27 'easy?' and how is he to guess how many thousandths of an inch the other man's gauge is wrong in its make, or how many hundredths of it has worn in years of steady use? This is no fancy sketch; the above are everyday difficulties in this age, every man knows just what he wants and will have nothing else, and yet has no better way of telling his wants than to say I want such a gauge 'tight,' when probably his gauge differs from every other gauge that was ever made."

Comparative Advantages and Disadvantages.

While it is possible to measure a piece of wire or a piece of sheet metal with the notched gauge, it is not so with gauges having circular holes. Their use is therefore limited to determining the dimensions of wire in cylindrical shapes only; in fact, they are only used as twist drill gauges and as gauges for cold-drawn steel rods.

These gauges are subject to wear equally as much as the notched gauges; and, as in the latter, if originally correct, an error caused by frequent use can be detected only with great difficulty. Furthermore, if such an error exists, it cannot be corrected.

The gauges with angular slots possess one great advantage over the two groups just described, and that is that they can be produced correctly in the first place without much difficulty. This makes it possible that these instruments can be brought upon the market at a comparatively low price, and makers can give a guarantee as to their accuracy. The same is the case with the above mentioned hole gauges. An error in these gauges is easily detected simply by testing their sides with a straight edge, and due allowance can be made therefor when subsequently used. However, they possess also the disadvantage that errors cannot be corrected and if worn, and accuracy is an object, they must be discarded.

It should be remembered that a mechanic, an electrician, a storekeeper, or others who make constant use of wire gauges are frequently in want of other information than that relating to the determination of the size of the material only. In most instances the thickness of the material in fractions or decimal parts of an inch is required besides the number of the gauge; frequently two different standards have to be compared with each other; or the weights of certain sizes are to be calculated; or the resistance, or carrying capacity and other information is lacking which is never found on one gauge, and rarely found complete in books of reference or trade catalogues or especially prepared tables.

It is true, some of the recent wire gauges of standard shape and make give dimensions in decimals of an inch, besides the gauge numbers. Others give the resistance of copper wire in addition to the gauge numbers, but there is none which permits a comparison of more than two gauges with their respective equivalents in decimals of an inch. The well known Micrometer Calipers, which enjoy an almost universal application in the mechanic arts, eliminate most of the above mentioned disadvantages of the ordinary kinds of standard wire gauges. I will here cite again a portion of the memorandum on gauges by Messrs. Miller, Metcalf & Parkin:

"There is a very easy and simple way out of this whole snarl, and that is to abandon fixed gauges and numbers altogether. The micrometer sheet metal gauges, made by the Brown & Sharpe Mfg. Co., of Providence, R. I., cost less than a common gauge, or no more. They measure thousandths of an inch very accurately, and even a quarter of a thousandth may be neatly measured. They are very simple, so that any boy of ordinary intelligence can be taught to use one in a very few minutes. They have very easy arrangements for readjustment, when worn, and even when worn considerably they can be used accurately, without adjustment, by making allowance for the error in reading at the zero line. We find that mechanics like to work to them, and that there is very little trouble to get sheet rolling done to within a thousandth of an inch on fine sizes. We urge all parties in ordering to give us dimensions and not numbers. We cannot now recall a single case of serious complaint having arisen where we have had dimensions expressed in decimals to work to."

There are micrometer gauges made which give readings in decimal parts of an inch or in decimal parts of a millimeter, or the weights of sheet metals in ounces. Others have on their face tables giving the equivalents of certain wire gauges and the resistance of commercial copper wire in ohms; or, in place of the latter, the equivalents of the diameters in mills and in circular mills. The latter instruments undoubtedly possess marked advantages over other forms of gauges as they give more accurate readings, are easily adjusted to accommodate

* Difference between No. 22 x 23 B. & S. W. G is .002876 inch.

wear and furnish additional valuable information. But yet there is a vast amount of information lacking which such an instrument could give to its user, if this were possible.

The use of the micrometer caliper is understood to-day by every good mechanic, but there are few who can use it when it is provided with metric divisions. And yet we may expect that the metric system will eventually become our standard. Calculations have to be performed, if such an instrument has not stamped on its face the equivalents of 8th, 16th, 32nd, and 64th in thousandths of an inch. Such calculations are liable to introduce errors, and they require time. Nor can every mechanic perform them. Much time is lost by comparing micrometer measurements with gauge numbers, or by transposing the same into common fractions, into units of length of a different standard as its division indicates, or by finding equivalents of weights for certain dimensions.

(To be continued.)

Bethlehem Steel Co.

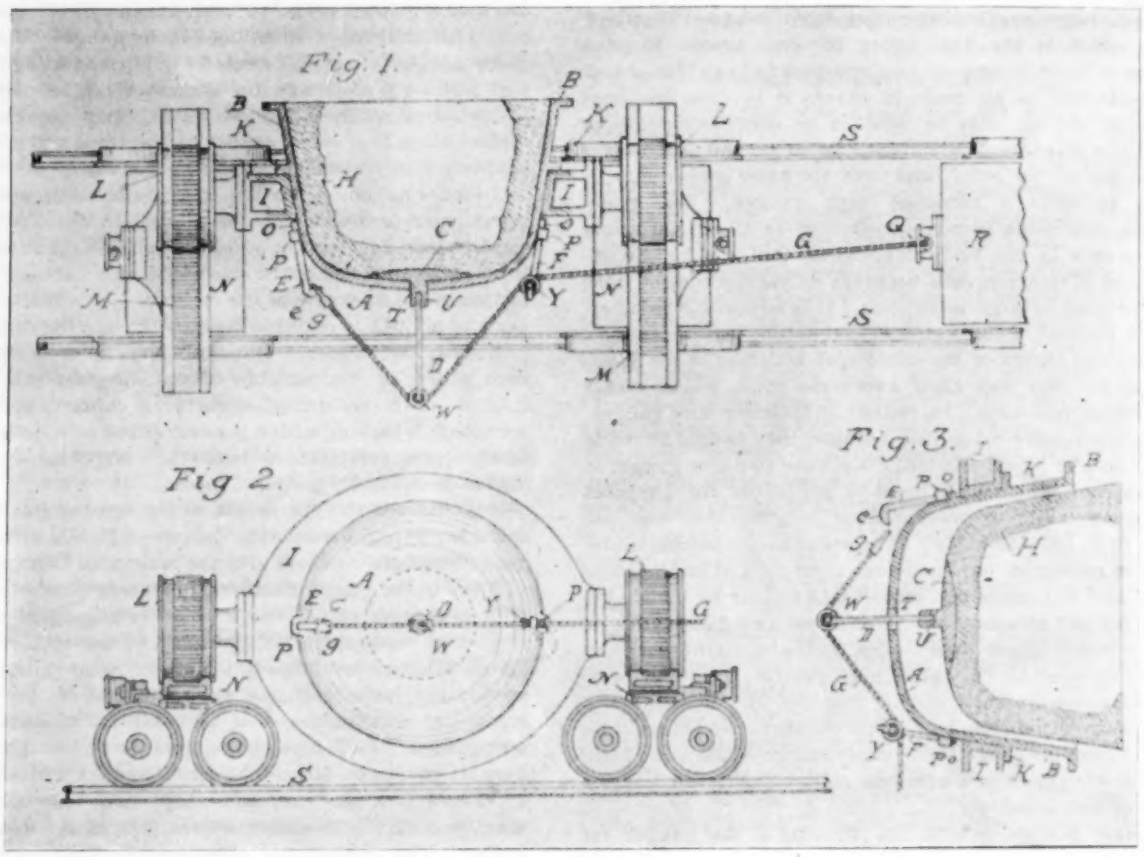
For some time plans have been forming for such a change in the Bethlehem Iron Co.'s status as was made some time ago in the case of the Cambria Iron Co., when it was acquired by the Cambria Steel Co. The charter of the Bethlehem Steel Co. will be taken out shortly. It is proposed to lease the Bethlehem Iron Co. to the Bethlehem Steel Co, on a guaranteed dividend rental basis. To this end stockholders will be given 30 days' notice of a meeting to vote on the proposition. In this connection it is understood that subscription privileges to the new stock will be given to Bethlehem Iron stockholders. The Bethlehem Iron Co has been paying on an average for a good many years 10 per cent or 12 per cent on its $5,000,000 stock issued, and as there is $5,000,000 more in the treasury it is inferred that the Bethlehem Steel Co. may guarantee 5 or 6 per cent on the total $10,000,000 stock likewise that the subscription privileges may be 1½ shares of steel company stock for one of iron company, the proposed capital of the new company being $15,000,000. Bethlehem Iron Co. stock is held largely by investors through Pennsylvania.

THE offices of Pickands, Brown & Co., pig iron sales agents of the Illinois Steel Co., have been removed from the 9th to the 11th floor of the Rookery, where much larger and better quarters have been secured.

DEVICE FOR CLEANING FURNACE SLAG POTS.

Erskine Ramsay, of Birmingham, Ala., who is connected with the engineering department of the Tennessee Coal, Iron & Railroad Co., has designed a mechanical slag-pot cleaner, and a patent has been granted him, in connection with Messrs. Shook, Barton, Shannon and Dunn. The construction and operation of the apparatus will be made clearer by reference to the illustration. The trouble from skulling in the use of ladles of the usual type is a common experience, and the expense of cleaning is an item calculated to stimulate invention.

The device in use in the Birmingham district provides a perforation T in the bottom of the slag-pot, and a cast iron plate C, with a lug U, having a socket which receives the end of the bar D. At the other end of the bar is journaled a guide pulley W. The bar E is attached to the pot. It has a hooked end formed by a projection e. Attached to the other side of the pot is the bar F, in the lower end of which is journaled a guide pulley or wheel Y. A chain or rope is secured to the projection e on the bar E, passes over the pulleys



DEVICE FOR CLEANING FURNACE SLAG POTS.

W and Y and the other end is provided with a shackle Q which may be connected with a locomotive.

In operation the plate C in the bottom of the cinder pot is soon covered by the skull H. To dislodge the latter the pot is turned on its side. The bar D is then inserted in the socket of the boss U, and the eye g of the rope adjusted over the projection of the rod E the rope being led over the two pulleys and connected with the locomotive or other source of power. A pull on the rope forces the rod D with considerable pressure against the plate, dislodging and ejecting the skull. When the bar has moved a sufficient distance to displace the skull, the eye g will slip off the hook e, detaching the rope and preventing any breakage in case the locomotive should move too far.

Before the introduction of the skulling device at Ensley, Ala., 18 Weimer slag ladles were required to handle the slag made from three blast furnaces, aggregating 650 tons of slag in 24 hours. Even with this number of ladles in use a certain proportion of the slag had to be run out to the cinder yard and loaded up into railroad cars when cold, or carted away. This necessitated the employment of a force of about six men per day forking cold slag, when everything was running smoothly.

If one or more of the 18 ladles were out of commission temporarily, through not being sufficiently cool to be cleaned or for necessary repairs, the men on the yard handling the cold slag, that the ladles would not take care of, had to be proportionately increased. The average force thus employed for 24 hours over a period was 13 men for three furnaces. The ladles were of the ordinary Weimer pattern lined with fire brick, and six ladles were required per furnace, three being used for flushing, while the three others were having the skull removed. From three to eight flushes, according to the basicity of the slag, formed a skull, which would curtail the fluid capacity of the ladles one-half. Three clean ladles would then be put at the furnace and the skulled ladles set out for cleaning. Without other cooling than by radiation the ladles would require to stand from 18 to 24 hours before being sufficiently cooled to allow a man to get at the skull with a pick. This was impractical without the employment of 12 ladles to the furnace; they were therefore filled with cold water and allowed to stand three to four hours, fresh water being added as it evaporated. The ladles were then again switched to the cleaning place and a man, after turning them down, picked the accumulated skull from each ladle. This took usually from two to three hours a ladle, and even longer, on slag that was exceptionally basic. Six men were thus employed per 24 hours for the three furnaces. The cold water coming in contact with the hot brick lining disintegrated the brick work and made frequent relining necessary. The removal of the blast furnace slag under these conditions was both expensive and annoying. Cast iron plates, or "staves" made in segments, were substituted for the brick lining, but unless made excessively heavy cracked and warped under the necessary watering down.

These conditions brought out the slag ladle skulling device. The lining of the ladles must be of some smooth hard substance, and tapering towards the top. The whole body may be made of cast iron like a kettle, or of wrought iron after the ordinary pattern with a cast iron lining. The lining may be cast all in one piece, or the sides and bottom separately, or the sides in segments bolted together with a brick bottom. The latter plan is in use at Ensley.

With the skulling device, three ladles to the furnace are found ample to take care of all the slag. As soon as a ladle is sufficiently skulled to require cleaning, the ordinary switching or dumping crew insert the bar in the socket in the boss of the bottom plate, attach the rope, couple to a locomotive, block the wheels of the ladle, and eject the skull. From three to five minutes is the length of time required to clean each ladle. The dumpers prefer to clean the ladles after every second flush, as they turn up much easier with a small skull. The cast iron lining is always hot while the ladle is in use, no watering is necessary, and the linings last from 10 to 14 times as long as with the old method of cleaning. No cleaners are required, and the furnacemen have clean ladles whenever they require them, and are hardly ever forced to run slag on the yard, which does away also with any cold cinder men.

The net saving at Ensley per furnace in labor alone is over $5 a day of 24 hours. Recently one dumper, fireman, engineer, and locomotive, the ordinary crew employed in the handling of the slag ladles, skulled nine ladles in 17 minutes, or about two minutes to the ladle On the viscid basic slag, such as is necessary in making an exceptionally low silicon pig, the cleaning device is invaluable. The Alice Furnace, making 175 tons of this iron per day, and about 200 tons of basic slag, can take care of the slag with one ladle equipped with the skulling device, whereas under the old method, four ladles were required and considerable trouble experienced. One ladle has been running continuously for nine months without necessitating any repairs.

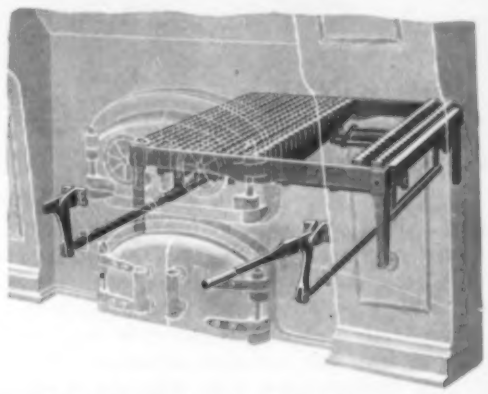
JAMES O'DONNELL, manufacturers' agent and broker in iron and steel, who was burned out in his former quarters, at 10 to 24 South Water st., Chicago, has opened offices at 504, 36 La Salle st., where he will continue in the same line of business and will represent the same makers of iron and steel as heretofore.

THE American Tin Plate Co. has declared a quartely dividend of 1¼ per cent payable April 29.

THE SENNETT ROCKING GRATE.

The Geo. B. Sennett Co., of Youngstown, O., has brought out recently an improved rocking grate of simple construction and high efficiency. As will be seen from the illustration, it stands on legs independently of the boiler walls, and can be set up under any boiler without disturbing the brick work.

The frame consists of flat bars of cast iron bolted to the legs at the corners, and having an extra heavy center bar running lengthwise dividing the frame into two independent sections. There are two rockers in each of these sections, supported on lugs cast on the center bar and side frames. They are connected below by shaker rods, as shown, so that the rockers in each section move together. The grate bars rest on these rockers Each bar is supported independently of all the others, this preventing any tendency to excessive friction and wear from the bars leaning on each other. The bars are provided with square teeth which project on each side, the teeth of one bar coming between the teeth of the adjacent ones and forming between the bars an irregular broken air opening. This arrangement secures the maximum proportion of air space to grate surface for a given opening between bars, a point of much importance where hot fires are required for working the boilers up to full capacity. The grate bars are all duplicates and any bar can be removed without disturbing any of the others They are arranged on the rockers so that when worked, each alternate bar is raised



and lowered parallel to itself. Only half of the grate is worked at one time, leaving the other half to be shaken or not, according to circumstances.

The grate is operated by a lever handle which is slipped on over one of the bell crank levers on the boiler front. A movement of a foot or 18 inches at the end of this lever is all that is required for shaking the grate and the leverage is such that the grate operates easily. With the up and down motion of the bars there is a small movement endwise which tends to crush or separate any soft cinder which may be in process of forming a large clinker, and to redcue it to a number of small fragments which ultimately are sifted down through the grate without clogging the draft. The action of the grate is to lift the bed of fire in parallel lines first along one set of grate bars and then along the alternate ones, thereby entirely breaking up the whole fire and allowing air to draw freely through it, producing a hotter fire and more perfect combustion. Under these circumstances the tendency to form clinkers is also greatly diminished as they are more liable to be formed with a clogged fire and imperfect combustion than when everything is going briskly.

All operations are performed with closed doors and no cold air is drawn in for a prolonged period, as is usual when cleaning fires with stationary grates, and the boilers are thus much less liable to become leaky. The rocking grate is especially useful for saving the time of firemen, as the cleaning of fires in a battery of boilers is often quite an undertaking by itself. With the rocking grates a set of men can attend to more boilers with the same labor, or the number of men required for a battery can be considerably reduced.

IT IS reported that the Cleveland & Pittsburg and the Pan Handle roads may be connected by the building of a line six or seven miles long, by extending the line built some time ago running south from the Cleveland & Pittsburg, at New Philadelphia, O.

LAKE SUPERIOR IRON MINING METHODS.—IV.*

BY DR. NELSON P. HULST.

The Queen Group at Negaunee.

The method of mining by the system of caving was made use of extensively on the Queen group of mines, situated at Negaunee, in the Marquette District, as early as 1890 Previously the method of mining by rooms and pillars have been in use. The large ore bodies which had been honey-combed by his method began crushing in 1889. The shafts located in the ore body were thus wrecked. A sudden settling of the surface over the ore body occurred in the fall of 1889, resulting in several fatalities, and many seriously injured. The failure of the room and pillar method of mining necessitated a change in the system of mining and choice was made of a caving system. It is what is known as the "North of England method." By this method the developed ore in this wrecked mine was successfully won. No other method could have accomplished as satisfactory results, for the crushed ore was practically all recovered.

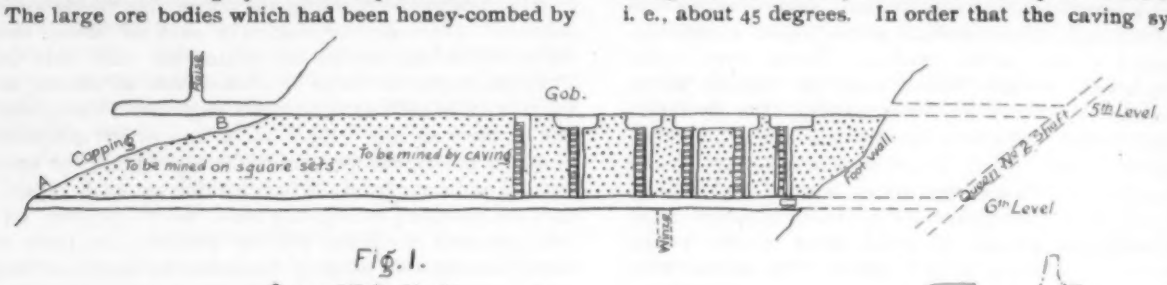


Fig. 1.

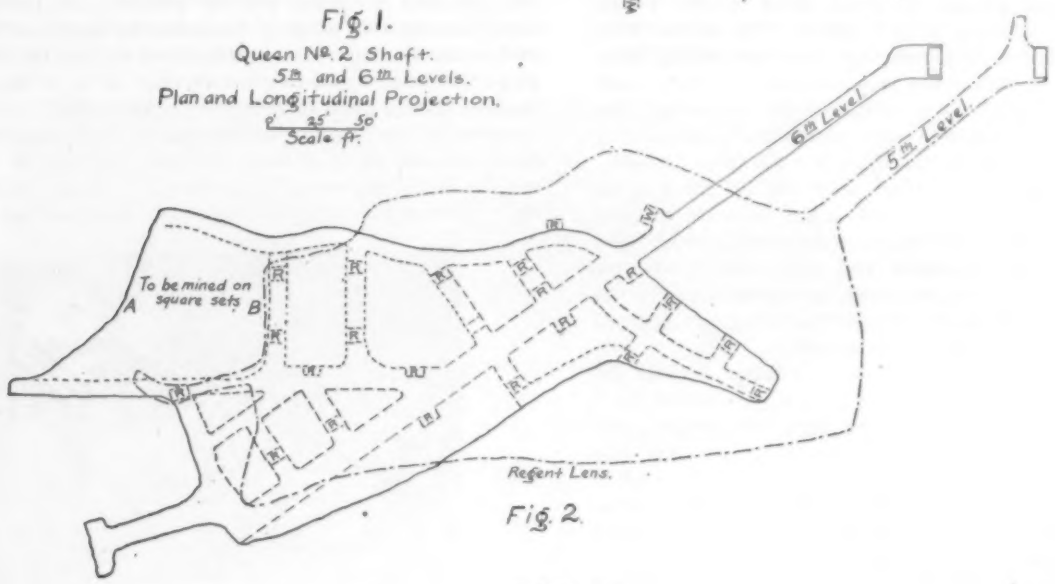


Fig. 2.

PLATE 5.

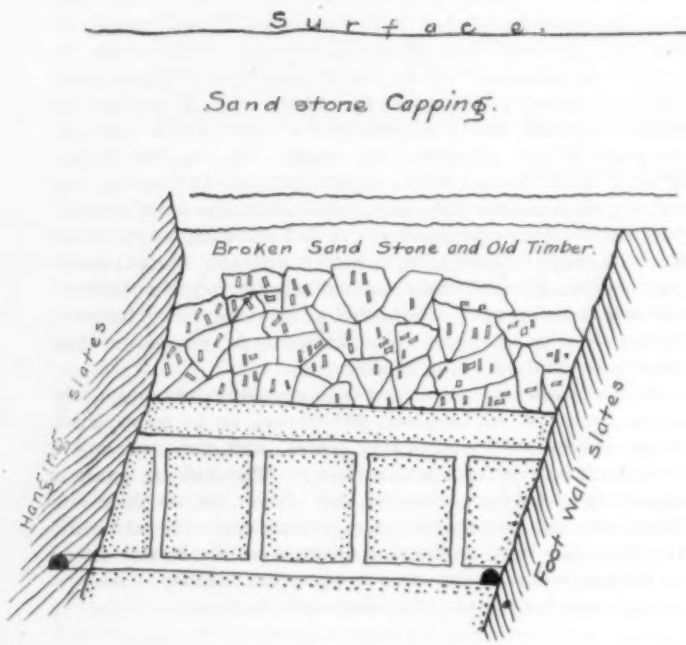


PLATE 5A.

When new developments below the wrecked portions of the ore bodies were begun, they were made with a view of continuing the use of the caving system. The shaft to reach the "Regent" lens at these mines was put down in rock alongside the ore body. It followed the pitch of the ore body, i. e., about 45 degrees. In order that the caving system be successful and economical of time, the overlying burden must settle or cave promptly. Otherwise, with large openings, there might be heavy and dangerous falls of ground. To obviate this, at the beginning of mining in this particular lens of ore, square sets, as they are called, were used to support the heavy capping immediately overlying the ore. This is shown on Plate 5, at the point A-B. As soon as the capping was moving, and the square sets began to crush, the timber was blasted and the capping let down. This gave the operators a good safe covering so that ore below first level could be won by caving method, and this method has been successfully applied in mining this lens of ore.

A section through openings on the sixth level is shown by Fig. 1 Plate 5. Up-raises are 25 feet or less apart so that miners working in ore from top of up-raises could shovel most of the broken ore directly into the mill. The up-raises are timbered up so that two compartments are made, one for ladder-way for men and for hoisting timber through, the other for mill to send broken ore through, with chute at bottom to load the ore quickly into tram cars. Putting up raises so close together obviates the necessity of using tram cars by miners to get the ore into mills and even wheelbarrows are seldom used. The ore is worked out in slices, or floors, of eight feet in height and timber seven inches and eight inches in diameter for temporary support only is used. When ore in each slice is removed, the ore in bottom is covered with waste timber, lagging, etc., to keep waste rock and other material from mixing with the ore, when same is being removed from next slice below. While this work is being prosecuted on one level, the shaft is sunk for another level, openings and up-raises made to send the ore broken by miners down to new level whenever the timbers in openings on level above crush so badly as to make tramming difficult on that level.

The quantity of ore that can be mined by this method in a given area is illustrated by the fact that in the Regent lens of Queen Iron Mining Co., in a deposit having an area of 286 feet by 147 feet and mining on one level at one time, an

* Read before the Engineers' Society of Western Pennsylvania, at Pittsburg, Feb. 21, 1899.

average of 1,200 gross tons of iron ore per day has been broken and sent to surface, and during some days the output has been 1,600 gross tons. The shaft was three compartment, 18 feet by five feet inside of timbers, two compartments for hoisting ore through, one compartment for water column, steam and air pipes. The hoisting machinery was duplex slide valve engines, 16-in.x20-in. cylinders, geared to drive two 5-foot diameter by 5-foot face hoisting drums. Skips were operated working in balance and three and one-half gross tons of ore were raised at each trip of skip.

On the Vermillion Range.

At the Chandler mine on the Vermillion Range, a large product is annually obtained by a method of caving not largely differing from the others described. This mine being so prominent a producer and its ore a brecciated hard ore, makes it seem desirable that the method of mining by which its ore is won be accorded a description. The following description of the method used has been kindly furnished me by Mr. John Pengilly, the manager of the Chandler Iron Co.:

The old system of mining, has been abandoned from the eighth level down. Above the eighth level we opened the mine with 75 feet levels, with four intermediate or sub-levels, between the main levels. The ore is dumped down the raises, converted into chutes to the main level, where it is trammed direct to the shafts. The first sub-level above the main level is not opened until we are ready to cave, and, in some instances, is not opened then if the ground shows an unusual amount of weight. To avoid a large opening, our experience so far has taught us to keep our caves as full as possible at all times and that we draw the capping as soon as possible after the ore. If the capping hangs, and does not come at once, there have been times when we have withdrawn our men for safety, until such time as the capping does come. This occurs only at the extreme east of the property, where we have always had the capping to contend with.

Our eighth level, and above, was originally opened, leaving large pillars. Raises for chutes were put up about every 50 feet to shorten the wheeling distance of the ore into them. It had also been found necessary to put up raises for ladder-ways to the sub-levels, so that in case of accident we can at all times withdraw our men. The ladder-ways are not put up by any rule, but as occasion requires. The main levels are opened with a nine-foot cap and seven-foot posts, giving in a level seven feet by seven feet in the clear. Our sublevels are opened with six foot timber, tunnel shape, three pieces constitute a set. Our raises are mostly three feet square in the clear. This size we consider easier to maintain from crushing and at the same time it can be guarded to better advantage than a large chute or raise.

When caving, we will run into, or slice, a pillar, and put up convenient raises or chutes for milling down the ore. Usually we commence to cave on the south and east of the deposit, working the caving back in a north-easterly direction, passing or caving such chutes or ladder-ways as we come in contact with. Our ladder-ways are put up on an angle of 65 to 75 degrees. In caving, although we are governed in cases by circumstances and the character of the ore, we always commence at the loose end and draw at all times to the foot wall or dyke. Timber for sub-levels is thrown down raises from the main level above and distributed from those points. Our tramming is done principally with mules to the main shafts. At the shafts are stationed a cage tender and an assistant to take the cars off and on the cage. In the station we have a system of tracks for loads and empties, giving ample room to hold a full train of two or three cars as brought in by the mule, which returns with as many empties. This work is done with a boy and mule.

FIG. 1.—TIMBER SHAFT HOUSE, NORRIE MINES, GOGEBIC RANGE. LARGE ORE POCKETS ARE CONTAINED IN THE SUBSTRUCTURE ABOVE LARGER OPENINGS THROUGH WHICH RAILWAYS PASS FOR LOADING.

FIG. 2.—MOUNTAIN IRON MINE, OLIVER IRON MINING CO., MESABI RANGE. STEAM SHOVEL MINING.

We have also found it to our advantage to keep our tracks well graded and well drained by ditches cut at the sides of the drifts. Thirty pound rails are used for tracks. This part of our business we consider very important, as it avoids delays and accidents. The mule distributes empties to the several switches where chutes are being used in the sub-level. These empties are filled by the trammers at the chutes, caves or drifts, and then replaced on their switches, whence the mule hauls them to the shaft. In this way we avoid tiring our men by walking or pushing cars for any considerable distance. We try to cut down our grade as near as possible to one foot to 100 feet where tramming is done. Six inches to 100 feet is sufficient grade and will be established by us in the future.

down the old No. 4 shaft, which is used for that purpose as a pocket. It is taken out on the eighth level and trammed to No. 5 shaft, 300 feet distant to the north. All ore below the eighth level is also dumped down No. 4 shaft or pocket to the thirteenth level, 110 feet below the eighth level and taken to No. 5 shaft and hoisted. No. 4 pocket has three compartments, for first and second grade ore and for rock. Our No. 2 and No. 3 shafts hoist from the seventh and eighth levels and will eventually hoist from the thirteenth.

Below the eighth level we open what is termed in this mine "main sub-levels," 22 feet from bottom to bottom. These levels are known as the 9th, 10th, 11th and 12th main sub-levels. The drifts are opened directly under the main eighth level drifts. The thirteenth level is opened somewhat differ-

FIG. 3.—MILLING SYSTEM. MILLED DOWN TO LEVEL. AUBURN MINE, MESABI RANGE.

Our hoisting is done on the vertical by cage and on the incline by skips; by high pressure engines and without balance. We have at times three to four levels to hoist from. Mules handle our ore on the surface. The ore on reaching the surface dumps automatically from the skip into a car to which a mule is attached, or if a cage the mule is hitched directly to the mine car. These cars are trammed or hauled to the stock pile. Empty cars, in both cases, follow the full one into the place it formerly occupied. This is done by

ently, owing to the pitch of the ore body. In opening up our main tramming level, we have rock drifts of considerable length from the ore body to each shaft.

To No. 5 shaft, 310 feet; to No. 3 shaft, 250 feet; to No. 2 shaft, 265 feet. These rock drifts are usually timbered and will measure at least 10 feet in clear or inside the timber. In mining our ore, we encounter much rock and clay in the form of horses, seams and bunches. This necessitates careful mining and much rock picking to keep the ore up to

FIG. 4.— MILLING SYSTEM, SHOWING CHUTE OF MILL. AUBURN MINE, MESABI RANGE.

means of a system of tracks running through and beyond the shaft house, doing away with the turn table and the transfer car or truck. A load for a mule on the stock pile is two to three two-ton cars. In the mine we endeavor to concentrate our men; working them in a certain section and giving a foreman charge of each gang of men, to see that they do a fair day's work and at the same time to protect them from danger. There are not more than 10 per cent of our men who speak the English language, and not more than the above number who have the remotest idea of mining. We do not allow any foreman to have charge of more than 25 men.

All ore mined on the seventh level as above is dumped

grade. On a basis of 600,000 tons of ore mined, we will hoist about 18,000 tons of rock, two-thirds of which actually comes from the ore body and one-third from the rock drifts, shafts, raises, etc.

Milling System on the Mesabi Range.

There has been introduced in the Mesabi range a method of mining called the "milling system." Many of the Mesabi ore bodies lie at no great depth from the surface, and a very flat dip is characteristic of all of them. When the depth of the overburden of sand and gravel is not great, and the conditions do not warrant the removal of the ore by steam shovels, the so-called milling system is very successfully

used. This method involves at the first an entire removal of the overburden of sand and gravel, leaving the uncovered surface of ore very clean. A shaft or shafts are sunk in the adjoining rock and crosscuts and drifts in the ore are driven, which connect with the shafts. Up-raises are made at numerous points from the crosscuts and drifts. These are properly timbered to serve for ore chutes, with the necessary spouts for loading the ore therefrom into tram cars on the levels or crosscuts. When the preparations for mining ore are completed, the ore about the up-raises is blasted into them. It is drawn from them into the cars stationed in the levels as rapidly as the facilities for handling the ore to the surface permit. The ore being very soft, up-raises are made at slight expense. The raises, closely spaced in the ore body, enable the winning of ore to be accomplished at a minimum of expense. It is evident that there is no lifting of the ore whatever by manual labor. In the blasting, much ore is tumbled directly into the chutes, and the unskilled laborers drag or push the ore down the slopes and into the chutes by their shovels with a minimum of effort. By this method of mining, the product of ore per day per man is very great. The waste of ore in this method of mining is practically nothing.

A large tonnage of the Mesabi ores is annually produced by steam-shovel mining. About 50 per cent of the Mesabi range product in 1898 was thus produced. This method of mining requires that the overburden of gravel and sand be removed so as to leave the uncovered surface of the ore body practically clean. A bank or bench of ore 20 feet high is found generally most advantageous. A higher bench will often give trouble by caving on the steam shovel at the time of blasting. Although the Mesabi ores are soft, yet as they lie undisturbed in the bed, they are too coherent to be shoveled without being blasted. In some of the mines there are hard strata, against which a steam shovel is not economically effective. The holes for blasting the ore are drilled by hand. Drawing the drills consumes much time. They are usually 15 to 16 feet apart and nine feet from the edge of the bench. They are driven 15 feet deep. Steel drills one and one-eighth inch in diameter are used. Men will drill three holes per day at the Mountain Iron mine. For cracking the holes at the bottom to make a cavity for a charge of black powder, three one-pound sticks of 40 per cent giant powder are used. Steam shovel mining, to be economical, requires that there be no delays in the work. Large tonnage is possible when conditions are all favorable. Two hundred and thirty-two cars, containing 5,825 tons, have been loaded at the Mountain Iron mine in 9¼ hours by a 90-ton Vulcan shovel. The best record for one hour has been 32 cars, or 800 tons.

FIG. 5.—BIWABIK MINE. EASTERN END OF PRODUCTION PORTION, MESABI RANGE.

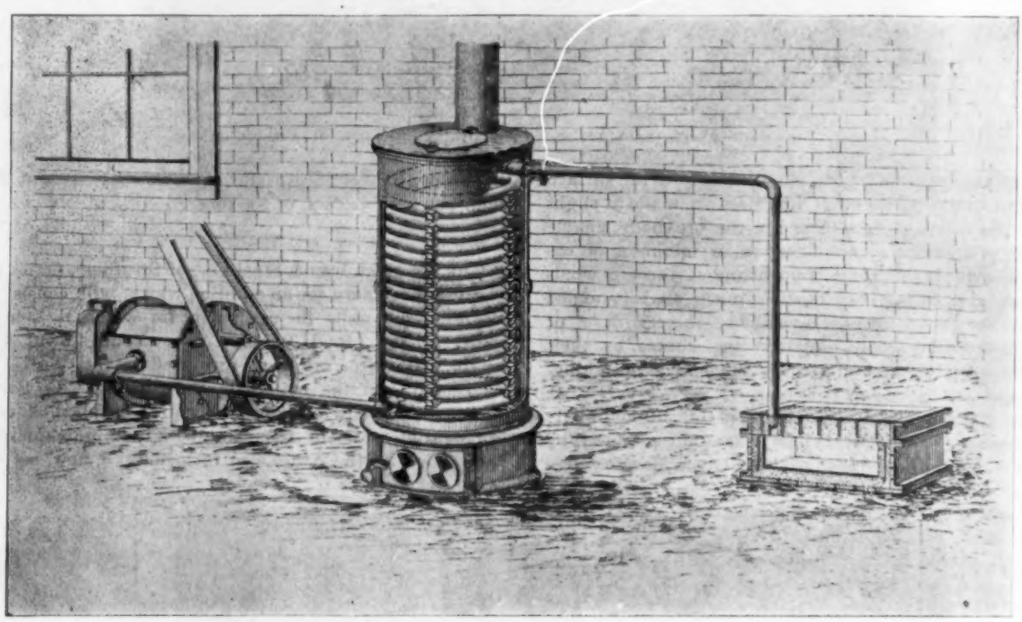
FIG. 6.—MAHONING MINE, WEST END MESABI RANGE. STEAM SHOVEL MINING.

THE Struthers Iron & Steel Co., of Struthers, O., is now installing machinery for an addition which will consist of two or three sheet mills, the equipment for which is being furnished by the Lloyd Booth Co., of Youngstown, O. The engine parts, etc., are being furnished by the Walker Co., of Cleveland, and the boilers by the Stirling Co., Barberton, O. The company has also recently installed a complete corrugating works in connection with their galvanizing shop. The Lloyd Booth Co. are also furnishing a new set of cold rolls. When these improvements are completed, this plant will consist of five sheet mills, two sets of cold rolls, and galvanizing and corrugating works. The company also operates its own bar mill and scrap furnaces for making iron and corrugating sheets.

THE Darnell rolling mill at Muncie, Ind., has been bought from Bassett, Presley & Train, of Cleveland, by J. H. Palmer and associates, of Chicago. There are 25 puddling furnaces, and a muck bar mill, and a finishing mill will be added. Horseshoe iron will be manufactured.

A METHOD OF DRYING MOLDS.

A new process for drying sand and loam molds used in dry-sand castings has been perfected by Noah Shaw, of Eau Claire, Wis., the object sought by the inventor being uniform, thorough and speedy drying of molds, avoiding the features in the ordinary method that have proved objectionable. Ordinarily the molds are made in iron flasks and finished with "blacking" or "wash." The molds and flasks are then placed in ovens and subjected to heat for 12 to 48 hours. Then the cores are put in place and the molds closed before the molten metal is poured into them. By the process shown below the molds are finished, the cores put in place while the molds are soft and not liable to crumble or crush, and the molds closed and kept closed until they are opened for the removal of the casting. It gives a guaranty of a more perfect mold and hence of a more perfect casting. In the case of large castings the process possesses advantages over the method by which molds made in the floor or loam are dried by the use of baskets of charcoal. In the latter method, as the molds cannot be closed to retain the heat, portions are not reached by the heat, and therefore are not properly dried. In addition, other portions of the mold are burned and the molds are filled with ashes and cinder. The latter drawback appears also in the molds dried in an oven.



A METHOD OF DRYING MOLDS.

The method developed at Eau Claire consists in forcing heated air under pressure into the molds after they are finished and closed, thus forcing the moisture outward through the pores of the sand, the heated air which follows converting the moisture into vapor and leaving the pores of the sand open for the free escape of gases generated by the molten metal when poured into the mold. It is not expected that the heated air will be forced under pressure uniformly through the walls of the mold, as the walls in some cases are of varying thickness and of different degrees of density.

The illustration shows coil pipes enclosed in a stove, the cold air being conveyed through a pipe connected with a blower. The discharge pipe from the heating cylinder conveys hot air to the mold. Originally a thermometer was employed and a pressure gauge, to insure against burning the mold, but by experiment a formula for the mixing of the loam was hit upon, which, with the result of experiment as to the time required for thorough drying, made results sure without the use of gauge and thermometer.

Wooden flasks may be employed with this process, in place of heavy iron flasks; and by introducing the heated air into the mold under pressure if there is any opening in the mold through which the molten metal could run out when the mold is being filled it is readily discovered and accidents resulting from such defects are obviated. Large castings are frequently spoiled and sometimes entirely lost by the running out of the metal through defective openings in the mold which remain undiscovered. The illustration shows a form of mold with a rectangular sand body, inclosed within a similarly shaped iron flask, provided in its sides, ends, and bottom with a number of vent-openings 16, which provide for the free passage of the heated air after being forced through the pores in the walls and bottom of the mold-body. In this form of mold the sand body is provided in its upper edge with a continuous annular vent-channel, with which communicate vertical vent-holes, formed in the side and end walls of the sand body and serving the usual function of providing for the escape of a portion of the gas generated by the molten iron. The mold is provided with the ordinary sand-cover section packed within the cope section of the flask, which is designed to be connected with the drag section in the usual manner.

Ten Per Cent Advance in Stoves.

A conference of stove manufacturers held at Chicago last week, attended by representatives of nearly 90 per cent of the stove-making capacity of the country, decided informally to advance the price of stoves at once not less than 10 per cent. This is in view of the advance in materials, which in the case of pig iron is over 40 per cent. An advance of 5 to 8 per cent in the price of stoves was made last fall, to cover advances in materials up to that time.

The announcement of the advance in the price of stoves was followed promptly by a conference between committees of the Iron Molders' Union of North America and the Stove Founders' National Defense Association, which was held in Chicago, March 15. It was decided to make a 10 per cent advance in the wages of stove molders, effective April 1. The committee from the union asked for 15 per cent advance and a compromise was made at 10 per cent. The increase will effect about 15,000 men.

It is decided that there will be no reduction in freight rates on iron and steel products shipped to New York for export from the Cleveland, Pittsburg, Wheeling and valley districts. Some time ago the manufacturers asked the railroads to make a concession in freight rates on iron products shipped to New York for export. The Central Freight Association appointed a sub-committee to consider the matter. It met in Cleveland last week, and its adverse decision is in view of the large advance in prices of iron and steel.

A proposition is on foot, headed by Chicago parties, to consolidate the straight link and coil chain manufacturers of the country, and a capitalization of $30,000,000 is talked of.

INDUSTRIAL SUMMARY.

New Buyers in the Market, and Some of Their Wants:—

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

The National Tool & Stamping Co., of Baltimore, has been incorporated by Siegmund B. Sonneborn, Jacob Wheatfield, John L. G. Lee, Max Skutch, and George T. Reed, all of Baltimore. The capital stock is $20,000, in shares of $200 each. The company will make hardware, buckles, garment fasteners, etc.

The Novelty Manufacturing Co., Jackson, Ten., is making inquiry for die presses.

The Hardie-Tynes Foundry & Machine Co., Birmingham, Ala., is in the market for one 42x20-inch lathe, one 20-inch "turret" lathe, one 30x30x8-inch planer, either new or second hand.

William McGann, Weston, W.Va., is in the market for a second-hand 8 or 10 h. p. gas engine.

Under the direction of W. M. Newkirk a large force of men is rapidly remodeling the old Detroit car shops corner of Adair and Wright streets., Detroit, Mich., for occupancy by the new Malleable Iron Co., recently decided upon, though as yet not incorporated, by those in control of the Detroit Sprocket Chain Co., Ltd. The property is owned by T. D. Buhl, president of the Detroit Sprocket Chain Co. It is stated that various consolidations of interests have made it advisable for the company to be in a position of independence in the matter of malleable castings supply. The plant will be thoroughly refitted, and will have modern appliances, with plenty of ground for extension later, if necessary. A complete outfit has already been purchased, including a supply of pig iron. The name of the company has not as yet been decided upon. The product will include a general line of work together with that naturally coming to it from the Detroit Sprocket Chain Co. The plant will be in operation some time in April.

New Construction:—

It is understood that W. H. Griffiths and John A. Scott, formerly president and vice-president of the Washington, Pa., Steel & Tin Plate Mills, have planned for the erection of a two-mill tin plate plant, the site for which has not yet been selected.

The Shickle, Harrison & Howard Iron Co., of St. Louis, is examining sites for a new building. Larger quarters are necessary, but the company has not decided to move to East St. Louis, as has been reported.

The Titusville Iron Co., Titusville, Pa., intend to erect an addition to their Franklin street plant. The new building will be 80x282 feet in size and will be constructed of brick and structural shapes, and will be used as a foundry and addition to the machine shop. It will be completed about Sept 1.

The Gates Foundry, at Wilkes Barre, Pa., is being torn down and will be replaced by a large brick structure 40x40 feet, with an annex 40x32 feet, fitted up with modern equipment.

The new plant of the Reading Screw Co., at Reading will be 80x220 feet.

The Rahn & Mayer Co., Cincinnati, is building a new machine shop, 50x150 feet, three stories.

A new machine shop is to be built at Plymouth, Pa., by Geo. H. Bittenbender. The contract has been let.

H. W. Caldwell & Son Co., Chicago, is preparing to erect a $50,000 steel and brick foundry, warehouse and machine shop.

Henry E. Pridmore, Chicago, will erect a machine shop and foundry, the former to be 60x100 feet, two stories high, and the foundry 60x150 feet, one story, with steel roof.

The Garry Iron & Steel Roofing Co., Cleveland will put up three brick and iron buildings, measuring 100x300 feet, 100x150 feet and 40x60 feet.

Fires and Accidents:—

At Montello, Wis., fire destroyed machine shop, carpenter shop, and electric light plant of the Montello Granite Co. Loss, $15,000; insured.

Repair Shops of the Radial Electric Railway, near Hamilton, Ont., burned. Loss, $4,500.

The Car Spring Works of Chas. Scott & Co., Philadelphia, on March 13. Loss over $200,000; insured.

Goins & Shanks' foundry at Washington, D. C., burned down March 11.

Power Equipment and Machine Tools.

The Cincinnati Planer Co. has been incorporated, with a capital stock of $30,000, by Wm. H. Burtner, Wm. H. Burtner, Jr., R. A. Holden, Jr., G. A. Armstrong, Jr., and B. B. Quillen, of Cincinnati.

The Wheeler Boiler Co., Sharon, Pa., has orders for one 300 h. p. boiler for gas for the Stewart Iron Co., Sharon; two 300 h.p. for the Ella Furnace, and one 200 h. p. for gas for the Fannie Furnace, at West Middlesex; four 200 h. p. to be used on waste heat for the Falcon Iron & Nail Co., of Niles, O., and one 100 h. p. boiler for the Union Limestone Co., of Struthers.

The American Steel & Wire Co. has called for bids on about 12,000 h. p. of water tube boilers, to be distributed among several of the plants. It is understood that some important improvements are to be made in the Pittsburg plants.

The Canton Pump Co, Canton, O., manufactures 26 different styles of steam pumps, including pumps for mining, for fire purposes, for boiler feeding, and for handling liquids, other than water. This company is enjoying a good trade, and concludes from the great increase in business that the wave of prosperity is at full height. The company will mail on application a descriptive catalogue, which gives useful information.

J. H. Gilmore, 130 Water st., Cleveland, O., is representing the Stewart Heater Co., of Buffalo, N. Y., in the sale of its well known Otis feed water heaters. A very satisfactory state of business is reported.

The Pittsburg District:—

A number of stove manufacturers in the Pittsburg district are understood as being willing to enter the proposed stove combine, those mentioned being A. Bradley & Co., with plant at New Kensington, Pa., Anschutz-Bradberry Co., Preble ave., Allegheny City, De Haven & Co., Ltd., Preble ave., Allegheny, Bissell & Co., F. L. Voegtly & Co., Allegheny, and Baldwin & Graham, with foundry at New Castle.

The Oil Well Supply Co., Pittsburg, has let contracts for the remodeling of one of the lap weld furnaces in its Elba iron works, and for a wholly new furnace, making a total of four in the plant.

A company is being formed in Pittsburg to control the manufacture of a pig iron casting machine under a patent just granted to R. W. Davies, of the Aetna Foundry & Machine Co., Warren, O. The plan of the machine is that of a rotary frame, carrying around its periphery molds arranged radially, these molds being made to tip as they pass a given point.

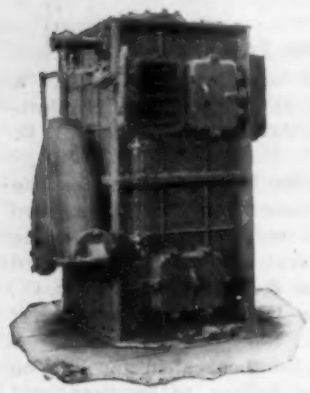
Wages of puddlers at the Elba Iron Works of the Oil Well Supply Co., Pittsburg, have been advanced to $4.25 a ton. These men are not connected with the Amalgamated Association. Other labor at the plant has been advanced about 5 per cent.

The last of the machinery of the old Lloyd mill, operated until 1896 by H. Lloyd, Son & Co., Pittsburg, has been removed.

The Pressed Steel Car Co., has received orders for 150 steel freight cars from the Chicago, Lake Shore & Eastern road and for 50 cars from the Lake Superior & Ishpeming road.

The project to erect a $12,000,000 ship building plant in which Pittsburg capitalists are interested is coming to a focus. Subscriptions are being received by Henry G. Morse, of Wilmington, Del., who is the projector. Mr. Morse was formerly president of the Harlan & Hollingsworth Co., of Wilmington, and of the Edgemoor Bridge Works. The shipyards would be located either on the banks of the Delaware or the Chesapeake. An effort is being made to secure the plant for the vicinity of Baltimore and Mr. Morse is said to have agreed to lend his influence to the Baltimore location provided Baltimore subscriptions amount to $3,000,000. It is claimed soon after he made this statement Baltimore people subscribed for $1,000,000 worth of stock.

A company is being formed of Pittsburg and Philadelphia parties to erect a seamless tube plant at Beaver Falls, Pa. The land has been secured, and about all the machinery ordered. S. Diescher, Pittsburg, has charge of the plans, and contracts for the buildings will be let this week. There



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The "COCHRANES" heat the water just as hot as exhaust steam can make it, and to all the other points that go to make a heater practical, serviceable, reliable and good, the most careful attention has been given, following the experience gained in building hundreds of thousands of horse-power of these appliances for modern steam plants.

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HARRISON SAFETY BOILER WORKS,
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Philadelphia, Pa.

Mfrs. of the Cochrane Separators.

will be 40 draw benches, making seamless tubes up to six inches in diameter, largely for oil purposes. Boiler tubes will also be made. H. G. Wasson, attorney, Park Building, Pittsburg, has been conducting the negotiations. Among those interested besides Mr. Wasson are E. H. Jennings, attorney; J. C. McDowell, vice-president of the Philadelphia Co., and an independent oil producer; M. Murphy, Philadelphia, independent oil producer; Grant McCargo, of the Pennsylvania Lubricating Co., a Standard Oil interest; F. M. Lowris, vice-president of the Tri-State Gas Co.; Roger Kemp, independent oil producer; George A. Dickson, Pittsburg; James H. Snow, connected with the Standard Oil Co., in New York city, and W. S. McManus, of Chester, Pa.

At Apollo, Pa., the steel department of the Apollo Iron & Steel Co. will start up. This department has not been operated for some time, but resumption was made necessary by the scarcity of steel.

Spang, Chalfant & Co., Etna, Pa., will advance wages 10 per cent on April 3.

The Monongahela Iron & Steel Co., whose plant is at Hayes Station, Pa., is installing an 18-inch mill to meet the demand for fine grades of muck bar and merchant sizes of billets for special work.

The Pittsburg Steel Casting Co., with a capital of $75,000, has been organized, and will apply for a charter this week. Its plant will probably be built at Sharpsburg.

Mackintosh, Hemphill & Co. have advanced the wages of employes 5 and 10 per cent.

Puddlers employed by the Republican Iron Works have been organized into a lodge of the Amalgamated Association. Puddlers of the Elba Works of the Oil Well Supply Co., have also entered the association.

The Chicago District:—

Edward M. Hagar & Co., who have represented the Southwark Foundry & Machine Co. for the past four years in the West, have recently taken the agency of the Mesta Machine Co., of Pittsburg, and the C. & G. Cooper Co. of Mt. Vernon, O. The Mesta Machine Co. was formed recently by the consolidation of the Robinson-Rea Mfg. Co. and the Leechburg Foundry & Machine Co. The company manufactures rolling mill machinery of all kinds, roll lathes, bar shears, pickling machinery, machinery for iron and steel works of all kinds, and lately is making a specialty of machine molded gears. The C. & G. Cooper Co. manufactures Corliss engines. Hagar & Co., who have their offices in the Rookery, are well equipped to handle this business, from education and long experience in the trade.

The firm of Ward & Nash, Boston and Chicago, having been dissolved by mutual consent Jan. 17, the business was divided, E. T. Ward and John Ward having bought the Boston store, while George Nash has bought the Chicago store. Mr. Nash will continue the business under the firm name of George Nash & Co., and will carry the same specialties as formerly. The firm deals in iron and steel, cold rolled steel, music wire, spring wire, drill rods, steel tubes, steel strips and wire, and springs for all purposes. They are also agents for Dannemora tool and self-hardening steels, and are general sales agents for the Hart & Cooley Mfg. Co., of South Chicago, manufacturer of cold rolled strip steel for blanking and deep drawing.

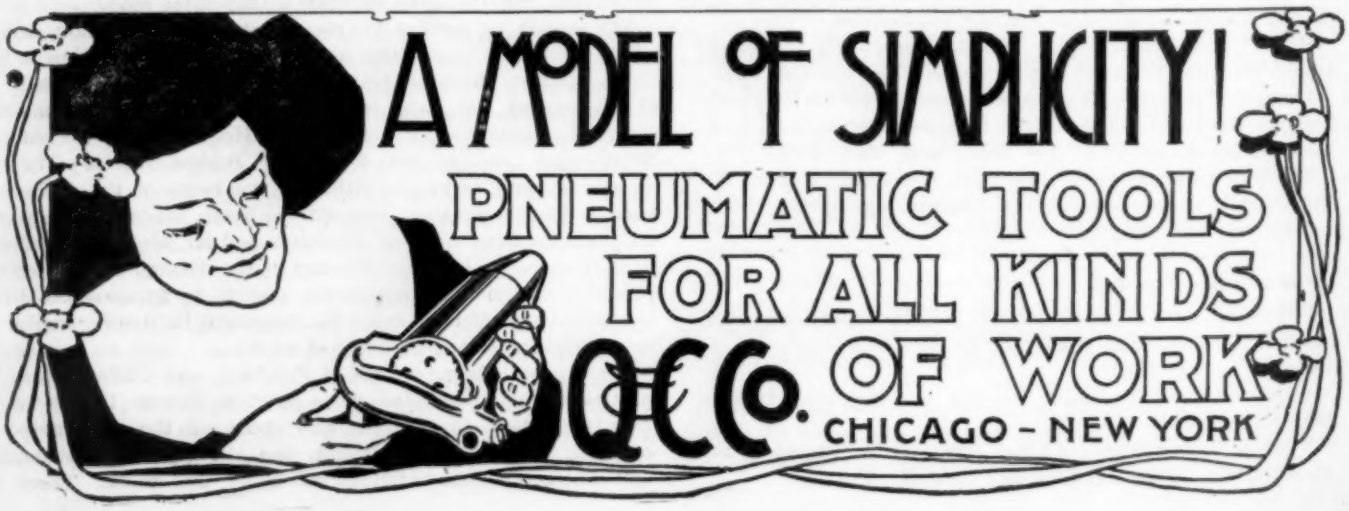
The South Chicago Furnace Co. has been incorporated at Chicago, with capital stock of $300,000, by Thomas M. Butters, Herbert M. Hall, and William H. Dayton. It is reported that the object of this new company is to erect a blast furnace at South Chicago on part of the property which, it was said at the time, was purchased for the purpose of building a tube and steel projectile plant.

The Snow Mfg. Co. has been incorporated at Geneva, Ill., with a capital stock of $10,000, by Thos. Snow, H. C. Goddard and J. A. Russell.

The Link Belt Machinery Co., Chicago, has certified to an increase of capital stock from $250,000 to $375,000.

General Industrial Notes:—

The McCullough Iron Co.'s plant at North East, near Elkton, Md., is being made ready to resume after several years' idleness.



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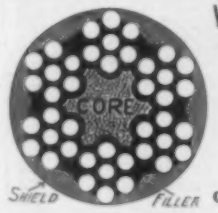
THE RIVERSIDE FOUNDRY CO., Cleveland, O.

Rolling Mill, Rod Mill, Wire Mill and Blast Furnace CASTINGS of Every Description.

CHILLED AND HARD GUIDES A SPECIALTY.



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Producer Gas under Tubular Boilers, saving 20 per cent in fuel. NO SMOKE.

The A B C of Iron, Now $1.

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STEAM TUBE WELDING WORKS.

Manufacturers of reworked boiler tubes Good second-hand tubes bought.

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FIRE BRICK.

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SUITABLE FOR

Furnace, Malleable, Mill, Foundry and Lime Kiln Work.

OAK HILL FIRE BRICK AND COAL CO.,
OAK HILL, OHIO.

Vice-President Sullivan of the Midvale Steel Co., is quoted to the effect that the company may bid on the next supply of armor plate for which the government advertises.

The Michigan Iron & Steel Co., which is starting up the Muskegon, Mich. rolling mill, is planning to erect another open-hearth furnace.

The work of lining No. 1 furnace of the Andrews & Hitchcock Co., at Hubbard, O., has begun and will go on night and day until it is completed. When this and other repairs are made the furnace will be put in blast.

It is reported that the Lorain Steel Co. is at work upon a connection with the Nickel Plate railroad, that will make a large saving in transfer charges. It will give, also, a more diect route to the company's limestone quarries at Sandusky.

Among recent foreign shipments by the F. B. Shuster Co., New Haven, Conn., whose wire straightening and forming machinery, special riveting machinery, etc., is so well known at home and abroad, are the following: Two machines to Stockholm, Sweden; two to Christenholm, Norway; a complete hinge outfit to Birmingham, Eng.; a wire straightening machine to Bombay, India; a ¼-inch automatic wire straightening and cutting machine to Carlswerk, Germany; one wire straightening machine to Leeds, Belgium, and two similar machines to Paris, and a complete riveting outfit with four riveters to Weisenfels, Germany.

Recent sales of Cochrane heaters include the following: Minnesota Iron & Steel Co., 850 h. p.; Dayton & Western Traction Co., West Alexandria, O., 300 h. p.; Chase & Co., Boston, 150 h. p.; Sears, Roebuck & Co., Chicago, 100 h. p. special; Douglas & Co., Minneapolis Minn., 200 h. p.; McGinn & Lewis, Pittsburg, 250 h. p. special; Avondale Mine, Plymouth, Pa., 850 h. p.; Parke & Lacy Co., San Francisco, Cal., 50 h. p.; Imperial Ice Co., Philadelphia, 100 h. p.; Bland, Bullen & Gund Co., Chicago., 350 h. p.; Liberty Mills, San Antonio, Texas, 200 h. p.; Republic Marble Co., Luttrell, Tenn., 150 h. p.; Pana, (Ill.), Modern Electric Light, Power and Street Railway Co., 500 h. p.; Alabama Ship Building & Dry Dock Co., Birmingham, Ala., 3,000 h. p.; Pabst Brewing Co., Milwaukee, Wis., 500 h. p.; Emery, Bird, Thayer Dry Goods Co., Kansas City, Mo., 600 h. p., special; Geo. F.

U. BAIRD MACHINERY CO.,
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Machine Tools and Supplies. Send for list of Second-hand Tools.

P & B Ruberoid Roofing
For covering buildings exposed to severe conditions, such as machine shops, foundries, etc. No paper to tear. No tar to run or melt. Absolutely the best. Has as a foundation the best wool felt. Not affected by acids, alkalies, coal-gas, steam, oil, grease or by great heat. Waterproof. Durable. Easily laid. . . . . .
Write for samples and prices.
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McDOWELL
SEMI-STEEL
PROCESS.
(Cupola metal.) Government tests 36,000 to 19,000 tens. strength.
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FOR SALE.
One 22 x 42 in. Wright Corliss Engine. Band wheel, 16 ft. x 36 in.
This engine is in first class order, and will be sold at a very reasonable price.
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Ore and Coal Handling Machinery
For Blast Furnaces, Docks and Mines,
From Latest Designs and Patterns.
MINING MACHINERY,
HIGH GRADE HOISTING ENGINES.
WEBSTER, CAMP & LANE MACHINE CO., Akron, O.

SHENANGO VALLEY STEEL CO., New Castle, Pa.,
MANUFACTURERS OF
Tin Plate Bars, Steel Billets, Blooms and Bessemer Pig Iron.

Blake Mfg. Co., New York, 100 h. p.; Municipal Light Plant, Germantown, O., 150 h. p.; Midland Chemical Co., Midland, Mich., 200 h. p.; Ajax Forge Co., Chicago, 200 h. p. special; Allen Dyeing Co., Philadelphia, 150 h. p.; Brown & Bailey, Philadelphia, 125 h. p. special; Richard Hecksher & Sons, Swedeland, Pa., 1,750 h. p.; Golden Belt Mfg. Co., Durham, N. C., 50 h. p., special; Wilcoxson & Bown, Frederick, Md., 50 h. p.; Pittsburg Plate Glass Co., Tarentum, Pa., 1,750 h. p.; Geo. J. Phillips, Chicago, 150 h. p., special; Howe-Brown & Co., Pittsburg, 600 h. p.; Laughlin & Co., Ltd., Eliza Furnaces, Pittsburg, four 4,000 h. p.; Western Brewing Co., Belleville, Ill., 850 h. p.; Northern Milling Co, Chicago, 500 h. p.; Vindicator Consolidated Gold Mining Co., Cripple Creek, Col., 300 h. p.; Pressed Steel Car Co., Pittsburg, three, 1,750 h. p.; Hampton Court Gas Co., London, England, 100 h. p.; Loveman, Joseph & Loeb, Birmingham, Ala., 300 h. p.; American Blower Co., Christiana, Norway, 100 h. p. The manufacturers are the Harrison Safety Boiler Works of Philadelphia.

The Enterprise Boiler Co., Youngstown, O., is building a new stove for Central Furnace of the Cleveland Rolling Mill Co., and doing repair work on other stoves.

A contract has been closed by President Monsarrat, of the Hocking Valley Railroad, for two ore handling plants, for the Toledo, O., docks.

Wages of the 3,000 employes of the Pencoyd Iron Works, Pencoyd, Pa., will be increased on March 27. Some departments are running double time.

At the annual meeting of the stockholders of the St. Louis Car Wheel Co., St Louis, Mo., the following directors were elected: J. H. Bass, Fort Wayne, Ind.; F. S. Lightfoot Fort Wayne, Ind.; John W. Nute, St. Louis; A. A. Hilton and J. J. Morse. The directors re-elected J. H. Bass, president, J. W. Nute, secretary and manager, and F. S. Lightfoot, treasurer.

The Falcon Iron & Nail Co. will install two new sheet mills at its Russia mill. The engine has been ordered and the new mills will be running after the July 1 shut-down.

The Burgess Steel & Iron Co., of Portsmouth, O., has increased its capital stock from $150,000 to $500,000.

The Wm. B. Pollock Co., Youngstown, O., is busy on the plate work in connection with the new furnaces at the Ohio Steel Co.'s plant, and on other orders.

The Sumac Co., of Rochester, N. Y., has made recently several important contracts for supplying its vegetable compound for removing scale in boilers. Among the plants supplied is that of the Rochester Gas & Electric Co., of Rochester, N. Y., nine 500 h. p. porcupine boilers. Also the several plants of the Rochester & Pittsburg Coal & Iron Co., comprising a total of 180 boilers. Severe and careful tests were made by this company. The Star Brewery Co., Pittsburg, also adopted this compound for regular use.

The Ohio Steel Co., Youngstown, O., has advanced wages of all men engaged in construction and track work 10 per cent. It is reported that 250 more men could be used on the company's construction work but the supply of such labor at Youngstown just now is not equal to the demand.

The Mahoning Valley Iron Co, Youngstown, O., will start its nail plate mill and its 55 cut-nail machines, which have been idle for some time.

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When properly installed and using cheap fuels great saving can be made in Fuel Bills.

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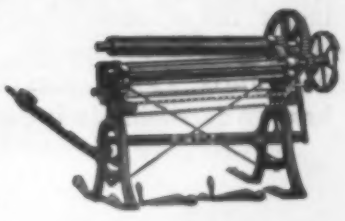

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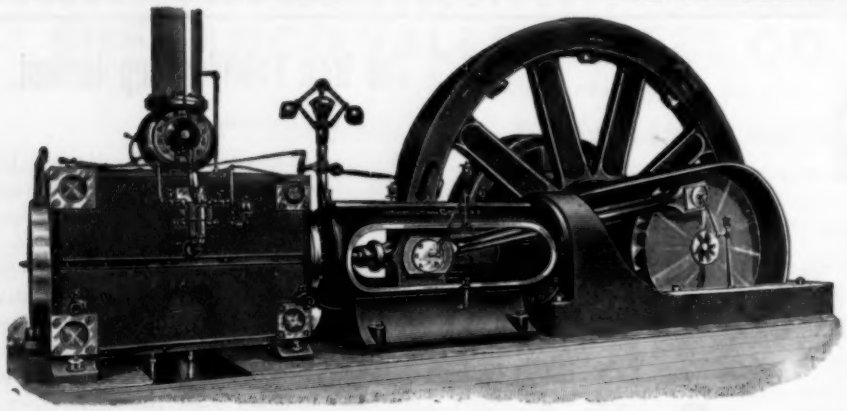

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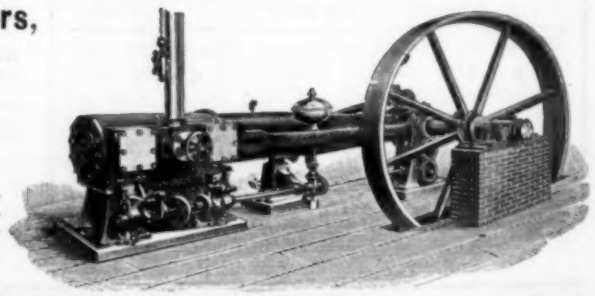

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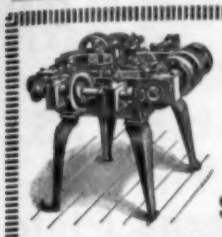

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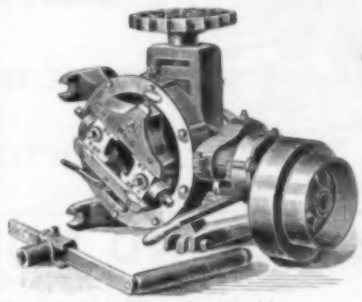

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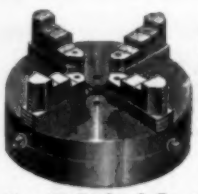

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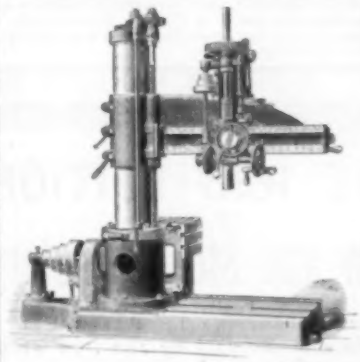

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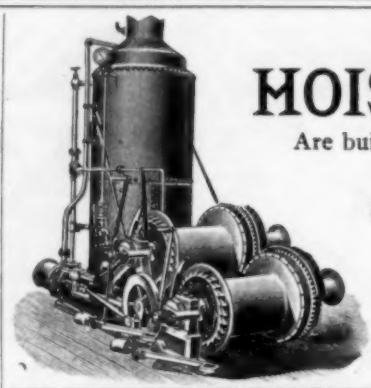

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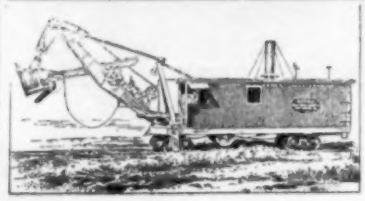

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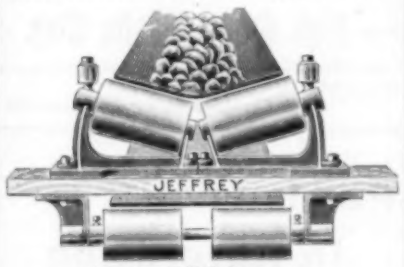

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EXTRACT FROM PREFACE:

In the preparation of the second edition of our Handbook, the general plan of the first edition has been followed, viz., to present in concise form such data and information as are useful to the chemist and metallurgist. Several tables of the first edition, which were of somewhat limited use, have been omitted, while more than one hundred pages of new matter have been added.

The methods for analysis of iron ore, iron and steel and for assaying have been given briefly, but perhaps as much in detail as is consistent with the general scope of the book. Several changes and additions to the Specific Gravity tables have been made by adoption of later and more accurate values.

In the notes on blast furnace practice have been outlined the more important theoretical and practical points, which, it is hoped, will be of some service to those interested in the manufacture of iron.

The hygrometric table gives the necessary information for determining the amount of moisture in air, a subject whose importance in metallurgical operations is being more fully recognized at present than heretofore. This table is new and is based on the most accurate data available at the present time.

The tables of weights and measures, United States and foreign, have been very much amplified, and the conversion tables for United States and metric weight and measures of the U. S. Coast and Geodetic Survey included, the latter being based on the legal standard for this country.

Numerous miscellaneous tables have been added, which, it is hoped, will be found of value

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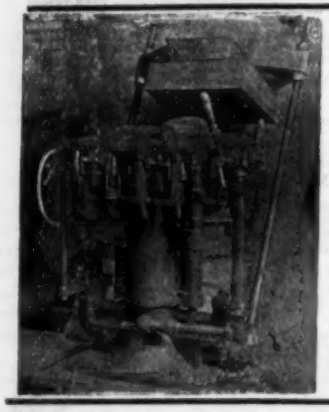

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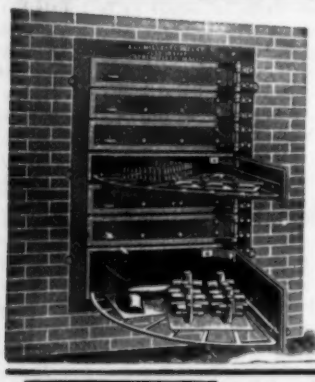

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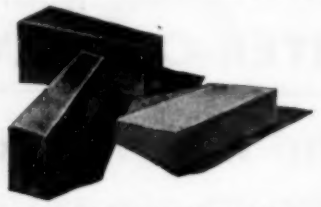

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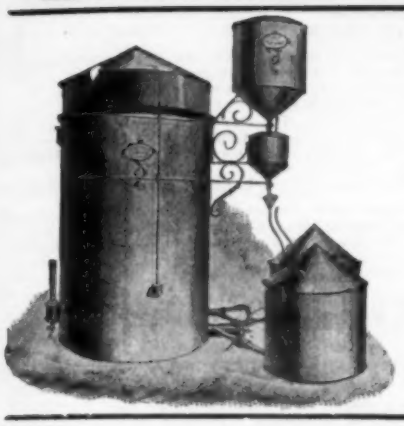

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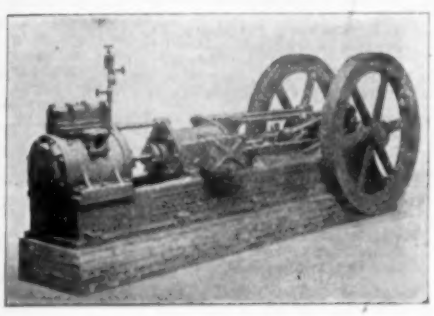

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James M. Swank, author of "Iron in All Ages," and editor of the *Bulletin* of The American Iron & Steel Association, in reviewing "Metallurgy of Cast Iron," says it is "One of the most valuable publications relating to the manufacture of iron castings, that has ever, to our knowledge, been issued in this or any other country."

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THE GOBEILLE PATTERN CO., Cleveland.

Between the Lakes and the Gulf, the Mississippi and the Allegheny Mountains—the best buying section of the United States—is the BULK of THE IRON TRADE REVIEW'S circulation. In this section advertisers in all trade papers get best returns.

IRON AND STEEL MARKETS.

IRON ORE.

[On Lake Erie docks.]

Special low-phosphorus hard Ore, Bessemer	$3.75
No. 1 Specular, Bessemer	$3.15@3.50
No. 1 Bessemer hematite	3.75@3.25
Hematites No. 1 non-Bessemer	1.90@2.10
No 1. Specular, non-Bessemer	2.00@2.40
Mesabi Bessemer	1.80@2.00

PIG IRON.

CLEVELAND (f. o. b. cars):	
Bessemer	$15 15
No. 1 Strong Foundry	$15 50@16 00
No. 2 Strong Foundry	15 00@15 50
Gray Forge, red short	14 65
Gray Forge, neutral	14 40
No. 1 American Scotch	15 90@16 25
No. 2 American Scotch	15 40@15 65
Lake Superior Charcoal	15 00@16 00
PITTSBURG:	
No. 1 Foundry	$15 50@16 00
No. 2 Foundry	15 00@16 00
Gray Forge	14 50@15 00
White and Mottled	13 50
Warm Blast Charcoal	15 00@17 00
Cold Blast Charcoal	22 00@26 00
Bessemer	15 00@15 2
CHICAGO:	
Lake Superior Charcoal	$15 50@16 50
Local Coke Foundry No. 1	15 00@15 50
Local Coke Foundry No. 2	14 50@15 00
Local Coke Foundry No. 3	14 00@14 50
Local Scotch Foundry No. 1	15 00@15 50
Local Scotch Foundry No. 2	14 50@15 00
Local Scotch Foundry No. 3	14 00@14 50
Southern Coke No. 1	15 50@16 00
Southern Coke No. 2	15 00@15 50
Southern Coke No. 3	14 75@15 00
Southern No. 1 Soft	15 50@16 00
Southern No. 2 Soft	15 00@15 50
Southern Silveries	15 00@16 00
Jackson Co. Silveries	15 00@15 00
Ohio Silveries No. 1	@
Ohio Strong Softeners	15 00@16 00
Alabama Car Wheel	17 50@18 00
Malleable Bessemer	15 00@15 50
Coke Bessemer	15 00@15 50
CINCINNATI (reported by Rogers, Brown & Co.)	
Southern Coke No. 1, Foundry	$14 75@15 25
Southern Coke No. 2 and No. 1 Soft	14 25@14 75
Hanging Rock Charcoal No. 1, Fdy	17 00@18 00
Tennessee Charcoal No 1	15 00@16 00
Jackson County Silvery No 1	16 00@16 25
Southern Coke, Gray Forge	12 75@13 00
" " Mottled	12 75@13 00
Standard Georgia Car Wheel	15 50@16 00
Lake Superior " "	15 50@16 00
BUFFALO:	
No. 1 Foundry Strong Coke Iron Lake Superior Ore	$14 25
No. 2 Foundry Strong Coke Iron Lake Superior Ore	13 75
Ohio Strong Softener No. 1	14 00
Ohio Strong Softener No. 2	13 50
Jackson Co. Silvery No. 1	15 60
Southern Soft No. 1	15 25
Southern Soft No. 2	14 75
Lake Superior Charcoal	14 00@14 50
Coke, Malleable	14 10
ST. LOUIS:	
Southern Coke No 1	$14 75
Southern Coke No. 2	14 25
Southern Coke No. 3	13 75
Southern Coke No. 4	13 5
Southern Gray Forge	13 20
Tennessee Charcoal No. 1	13 75
Jackson County 8 per cent Silicon	16 25
Lake Superior Coke No. 1	15 00@16 0
Southern Car Wheel	15 25@16 25
Genuine Connellsville Coke	4 15
West Virginia Coke	4 10

OLD RAILS AND SCRAP METAL.

[Delivered Cleveland.]	GROSS TONS
Old iron rails	$18 00
Old steel rails (6 ft. and over)	14 00
Old steel rails (6 ft. and under)	14 00
Old car wheels	16 00
	NET TONS
No. 1 R. R. wrought scrap	$ 6 50
Mill scrap	11 50
No. 1 Machine cast scrap	12 50
Iron axles	19 00
Axle turnings	11 00
Wrought turnings (free from cast)	10 00
Cast borings	7 50
Uncut wrought iron boilers	7 00
Steel boiler plates	11 00
Grate bars	8 00
Pipes and flues (clean)	10 00
Tank iron	12 0
Hoop and band iron	9 00
Sheet iron	8 00
Wrought drillings	10 00
Malleable iron	10 50

STRUCTURAL MATERIAL.

Beams and Channels (f. o. b. Cleveland)	1 50c
Angles	1 50c
Tees	1 50c
Universal Plates	1 80@1 90c
Sheared Plates	2 00c

MERCHANT IRON AND STEEL.

[Less than car-lots, Cleveland.]

Rounds and Squares.—Bar Iron.

1 to 1½	1.50 Base.
2 to 2½	.20 extra.
3 to 3½	.50 "
3½ to 4	.80 "
4½ to 4½	1.00 "
4½ to 5	1.50 "
5½ to 6	1.0.80 "
5½ to 6½	22 "

VITRIFIED EMERY AND CORUNDUM WHEELS. . .

FOR

Foundry and Machine Shop Work.

CAN BE RUN WET OR DRY.

SOLD BY
Weed & Co., Buffalo, N. Y.
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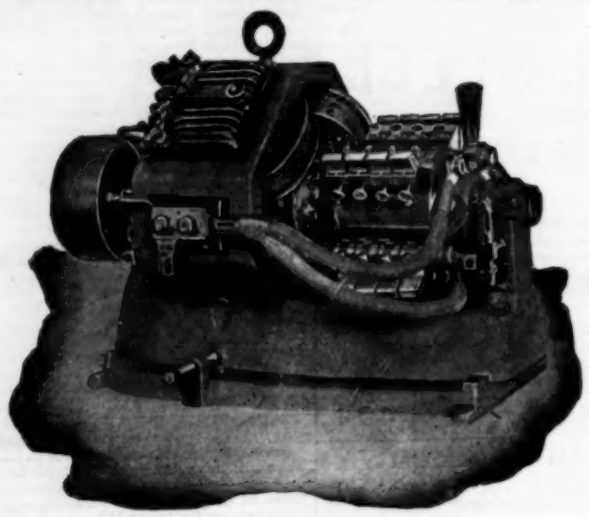
Machinist Supply Co., Chicago, Ill.
Sligo Iron Store Co., St. Louis, Mo.

VITRIFIED EMERY WHEEL CO.,
Westfield, Mass.

Eddy Dynamo Electro-Plating Machines

FOR

BICYCLE PLATING PLANTS.



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EXCLUSIVE WESTERN SELLING AGENTS.

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THE U.S. HOTEL CO.
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MANAGERS

50 ROOMS AT $2.00
50 ROOMS AT 2.50
75 ROOMS AT 3 TO 4.00
All Meals
50¢ Each

American Foundry Practice.

Treating of loam, dry sand and green sand molding, and containing a practical treatise upon the management of cupolas and the melting of iron. By THOMAS D. WEST, practical iron molder and foundry foreman. Fully illustrated. Revised. 408 pages; cloth.

Price, ... $2.50.

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THE IRON TRADE REVIEW,
37 Vincent St., CLEVELAND, O.

Metallurgy of Cast Iron, Price $3.00.

6⅝ to 7¼	2.50 extra
⅜ to ⅞	.10 "
⅝ to 11-16	.20 "
⅞ to 9-16	.30 "
7-16 to 15-32	.40 "
⅜ to 13 2	.50 "
5-16 to 1 ·32	.70 "
¼ to 9-32	.90 "
7-32	1.40 "
3-16	2.50 "

Flats.—Bar Iron.

1⅛ to 4 x ⅜ to 1	1.05 Base
4⅛ 0 6 x ⅜ to 1	.10 extra
6⅛ 0 8 x ⅜ to 1	.60 "
8⅛ 0 10 x ⅜ to 1	.80 "
1⅜ 0 4 x 1 1-16 to 1⅜	.30 "
4⅛ to 6 x 1 1-16 to 1⅛	.40 "
6⅛ to 8 x 1 1-16 to 1⅛	.60 "
8⅛ to 10 x 1 1-16 to 1⅛	.90 "
2 to 4 x 1⅜ to 2	.50 "
4⅛ to 6 x 1⅜ to 2	.60 "
6⅛ to 8 x 1⅜ to 2	.80 "
8⅛ to 10 x 1⅜ to 2	1.00 "
2 to 4 x 2⅜ to 3	.60 "
4⅛ to 6 x 2⅜ to 3	.80 "
6⅛ to 8 x 2⅜ to 3	1.00 "
1⅛ to 1⅜ x ⅜ to 1	.10 "
1 to 1 1-16 x ⅜ to ⅞	.20 "
⅜ to 15-16 x ⅜ to ⅞	.40 "
⅝ to 11-16 x ⅜ to ⅞	.50 "
⅞ to 9-16 x ⅜ to ⅞	.90 "

Heavy Band Iron.

7 to 10 x ¼ to 5-16	.70 extra.
6⅛ to 6⅜ x ¼ to 5-16	.50 "
4⅛ to 6 x ¼ to 5-16	.30 "
1⅜ to 4 x ¼ to 5-16	.20 "
1 to 1⅜ x ¼ to 5-16	.30 "
⅜ to 15-16 x ¼ to 5-16	.50 "
⅝ to 11-16 x ¼ to 5-16	.80 "
⅞ to 9-16 x ¼ to 5-16	1.00 "
⅜ to 7-16 x ¼ to 5-16	1.50 "

Heavy bands, 7-32 in. thick 1-10 c. per lb. higher than ¼ to 5-16 thick. **Bevel Edge Shaft Iron** 1-10 higher than same size of Heavy Bands.

Light Band Iron.

7 to 8 x No. 9 to 3-16	.90 extra
7 to 8 x Nos. 10, 11 and 12	1.00 "
6⅛ to 6⅜ x No. 9 to 3-16	.70 "
6⅛ to 6⅜ x Nos. 10, 11 and 12	.80 "
4⅛ to 6 x No. 9 to 3-16	.50 "
4⅛ to 6 x Nos. 10, 11 and 12	.60 "
1⅛ to 4 x No. 9 to 3-16	.40 "
1⅛ to 4 x Nos. 10, 11 and 12	.50 "
1 to 1 3-16 x No. 9 to 3-16	.50 "
1 to 1 3-16 x Nos. 10, 11 and 12	.60 "
13-16 to ⅞ x No. 9 to 3-16	.60 "
13-16 to ⅞ x Nos. 10, 11 and 12	.70 "
11-16 to ¾ x No. 9 to 3-16	.80 "
11-16 to ¾ x Nos. 10, 11 and 12	.90 "
9-16 to ⅝ x No. 9 to 3-16	1.00 "
9-16 to ⅝ x Nos. 10, 11 and 12	1.10 "
7-16 to ½ x No. 9 to 3-16	1.30 "
7-16 to ½ x Nos. 10, 11 and 12	1.40 "
⅜ x No. 9 to 3-16	1.50 "
⅜ x Nos. 10, 11 and 12	1.60 "

Bevel Edge Box Iron.

Same as Light Bands, of same sizes.

Beaded Band Iron, 1¼ in. to 2 in.

Sand Band Iron, 1-10 c. above same sizes o Light Bands.

Oval Iron.

⅜ to 1¼	.40 extra.
¼ to 13-16	.50 "
⅜ to 11-16	.60 "
½ to 9-16	.80 "
⅜ to 7-16	1.10 "
½ to 9-16 x 3-16	1.00 "
⅜ to 11-16 x ⅛	1.20 "

Half Oval and Half Round.

2¼ to 3	.60 extra
⅜ to 2	.50 "
¼ to 13-16	.70 "
⅜ to 11-16	.90 "
½ to 9-16	1.20 "
⅜ to 7-16	2.50 "
5-16	3.50 "
¼	4.50 "

Half Ovals less than ¼ their width in thickness, extra price.

Horse Shoe Iron.

All sizes..... 1 c. extra.

Cutting ordinary bars to specified length, .20 to .30 extra, according to length and size.

Steel Bands.

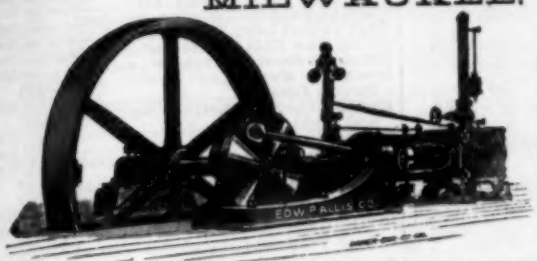
Width In Inches.	English Standard Gauge.	
1 1-2 to 6,	Nos. 7, 8, 9 or 3-16 "	1.50 Base.
		Extras.
1⅛ to 6,	" 10, 11, 12 or ¼"	.05 per 100 lbs.
1 to 1⅜,	" 7, 8, 9 or 3-16"	.10 "
1 to 1⅜,	" 10, 11, 12 or ¼"	.15 "
13-16 and ⅞,	" 7, 8, 9 or 3-16"	.20 "
13-16 and ⅞,	" 10, 11, 12 or ¼"	.25 "
11-16 and ¾,	" 7, 8, 9 or 3-16"	.30 "
11-16 and ¾,	" 10, 11, 12 or ¼"	.35 "
9-16 and ⅝,	" 7, 8, 9 or 3-16"	.40 "
9-16 and ⅝,	" 10, 11, 12 or ¼"	.45 "
½,	Nos. 7, 8, 9 or 3-16"	.55 "
½,	" 10, 11, 12 or ¼"	.60 "
7-16	" 7, 8, 9 or 3-16"	.75 "
7-19	" 10, 11, 12 or ¼"	.85 "
⅜,	" 7, 8, 9 or 3-16"	.95 "
⅜,	" 10, 11, 12 or ¼"	1.05

Iron and Steel Hoops.

Width Inches.	English Standard Gauge.	
7-16 to 3	Nos. 13, 14, 15 and 16	1.60 Base
		Extras.
7-16 to 2,	" 17, 18, and 19	.05 per 100 lb
7-16 to 2,	" 20	.10 "
7-16 to 2,	" 21	.15 "
7-16 to 1¼,	" 22	.25 "
¼ to 1¼,	" 13, 14 and 15	.05 "
¼ to 1¼,	" 16, 17 and 18	.10 "

THE EDWARD P. ALLIS COMPANY

MILWAUKEE, WIS.



MANUFACTURERS OF

Blowing Engines, Hoisting Engines, Pumping Engines Air Compressors, Special Engines for Electric Lighting Street Railways and Rolling Mills, Ore Crushers, Crushing Rolls, Stamp Mills Concentrators, General Mining Milling and Smelting Machinery.

Reynolds Corliss Engines.

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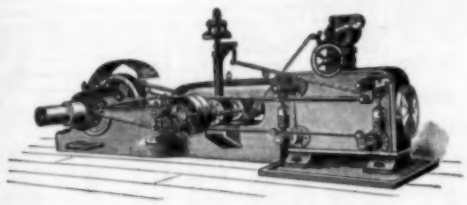
THE LANE & BODLEY CO.,

CINCINNATI, OHIO.



Engines,

ALL SIZES.

Simple and Compound.

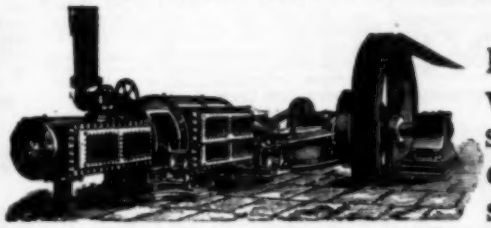
Shafting, Hangers, Pulleys.

Belt Elevators, Saw Mills.

WILLIAM TOD & CO.

YOUNGSTOWN, OHIO.

The Porter-Hamilton Engine



Reversing Engines, Blowing Engines, Converters, Hydraulic and special heavy machinery for the iron and steel trades.

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SEWARD S. BABBITT.

Who builds the best Mine Pump?

PRESCOTT.

Fred. M. Prescott Steam Pump Co.,

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Sennett Compression Coupling

And Other Specialties.

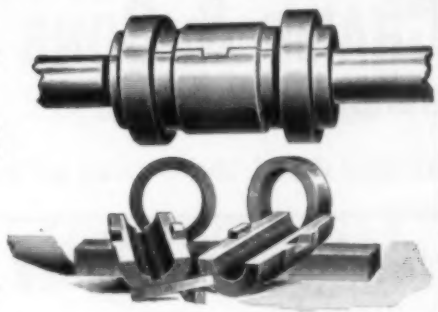
We do not claim novelty in these Couplings so much as good material, good workmanship and extreme simplicity. We make them of a very strong cast iron, with wrought iron bands.

We make also the

SENNETT ENGINE

20 to 40 H. P.

Foundry contracts solicited for duplicate castings, from 10 lbs. to 5 tons each.



1¼ to 1⅜,	" 19 and 20	per 100 lbs
1¼ to 1⅜,	" 21	.20 "
1¼ to 1⅜,	" 22	.30 "
15-16 and 1,	" 13, 14 and 15	"
15-16 and 1,	" 16, 17 and 18	.15 "
15-16 and 1,	" 19 and 20	.20 "
15-16 and 1,	" 21	.25 "
15-16 and 1,	" 22	.35 "
⅞,	Nos. 13, 14 and 15	.20 "
⅞,	" 16, 17 and 18	.25 "
⅞,	" 19 and 20	.30 "
⅞,	" 21	.35 "
⅞,	" 22	.45 "
¾ and 13-16	Nos. 13, 14 and 15	.30 "
¾ and 13-16	" 16, 17 and 18	.35 "
¾ and 13-16	" 19 and 20	.40 "
¾ and 13-16	" 21	.45 "
¾ and 13-16	" 22	.50 "
¾ and 13-16	" 23	.60 "
11-16,	Nos. 13, 14 and 15	.35 "
11-16,	" 16, 17 and 18	.40 "
11-16,	" 19 and 20	.50 "
11-16,	" 21	.60 "
11-16,	" 22	.70 "
11-16,	" 23	.80 "
⅝,	Nos. 13, 14 and 15	.40 "
⅝,	" 16, 17 and 18	.45 "
⅝,	" 19 and 20	.55 "
⅝,	" 21	.65 "
⅝,	" 22	.73 "
⅝,	" 23	.85 "
9-16,	" 13, 14 and 15	.45 "
9-16,	" 16, 17 and 18	.50 "
9-16,	" 19 and 20	.60 "
9-16,	" 21	.70 "
9-16,	" 22	.80 "
9-16,	" 23	.90 "
⅝,	" 13, 14 and 15	.55 "
⅝,	" 16, 17 and 18	.60 "
⅝,	" 19 and 20	.70 "
⅝,	" 21	.80 "
⅝,	" 22	.90 "
⅝,	" 23	1.00 "
7-16,	" 13, 14 and 15	.80 "
7-16,	" 16, 17 and 18	.90 "
7-16,	" 19 and 20	1.00 "
½,	" 13, 14 and 15	1.00 "
½,	" 16, 17 and 18	1.10 "
½,	" 19 and 20	1.20 "

Sheet Iron.

No. 10	1 50
No. 12	1 70
No. 14	1 60
No. 15-17	1 75
No. 18	1 85
No. 20	2 00
No. 22-24	2
No. 25-26	2 20
No. 27	2 30

English Tool Steel.

Jessop's	15½c
Hobson's "Best"	15½c
" "Choice"	35c

Steel Boiler Plates—1-4 in. and Heavier.

Tank	1 35
Shell	1 45
Flange	1 55
Marine Flange	1 60
Fire Box	2 05

Above includes plates 90 inches wide.

90 to 96 in. wide	½c. lb. extra
96 to 100 in. wide	1c. "
100 to 104 in. wide	1½c. "
104 to 106 in. wide	special.

Flats.	cts. lbs.
2 to 9-16 in. wide by 2 to ¼ thick	.08

Bessemer and O. H. Steel.

Bessemer Machinery	base price, 1 40
Open-hearth Tire	" 1 45
Open-hearth Spring	" 1 80
Sleigh Shoe	" 1 45
Toe Calk	" 1 90
Cutter Shoes, tapered and bent	" 1 60

American Cast Tool Steel.

ROUND, SQUARE, AND OCTAGON.	cts. lbs.
1 to 2 in. inclusive	.08
9-16 to ⅝ in. "	.08
7-16 to ⅝ and 2⅝ to 3 in	.09
3⅛ to 4 in	.09½
⅝ to 11-16 and 4⅛	.10
⅝ to 6 in	.10½
⅝ to 9-32 and 6⅛ to 7 in	.11
1 in	.13

Burden Boiler Rivets.

⅛, ¼, 11-16 and ⅝ inches diameter	3 00
Bridge ⅛, ¼, 11-16 and ⅝ inch diam	2 55

Wrought Pipe and Boiler Tubes.

Lap weld black, base, and 10 per cent	.78
Butt " " " "	.72
Lap " galv. " "	.70
Butt " " " "	.67
Boiler tubes 2¼" and smaller	.72½
Boiler tubes 2½" and larger	.75
Casing screw and socket joint	dis. 50
Casing inserted joint	dis. 45

MACHINERY SUPPLY MARKET.

[From Store, Cleveland.]

Anti-Friction Metals.

Magnolia Anti-Friction Metal, 25 cts. per lb., f. o. b. New York or Chicago.
No Name Metal, 15 cts. per lb., f. o. b. New York or Chicago.
Mystic Metal, 10 cts. per lb., f. o. b. New York or Chicago.

Anvils.

American	₩ lb 08¼
Wright's	₩ lb 12

Bellows.

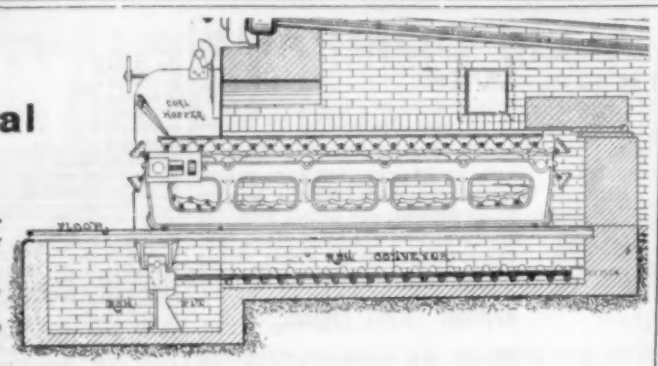
Blacksmiths'	Hill's dis
	Bullock's dis 50 & 1
Moulders'	dis 40&10&10
Hand	dis 40&10&50

The Playford Mechanical Stoker

Guaranteed to Abolish smoke, to increase boiler capacity and to save fuel.

For information, address,

The Playford Stoker Co.
404 Telephone Bldg.,
CLEVELAND, OHIO.



IRON CLAD PAINT CO.

Factory, 75 & 77 Central Way. Sec. & Treas., No. 3 Case Build'g.
CLEVELAND, OHIO.

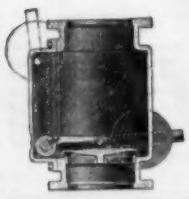
ORDER DIRECT FROM THE
Iron Clad Paint Co.

And get the genuine article, and save liability of suit for using an article made in violation of the patents issued to Wm. Green, and now owned by this Company.

IRON CLAD PAINT is the most durable, most fire-proof and Cheapest Paint made.

FURNISHED both Dry and Ground in Oil

USED BY NEARLY ALL THE RAILROADS.



Excelsior Straight-Way Back Pressure Valve.

This valve has no dash pots, springs, guides or complicated levers to get out of order. It is simple, reliable and well made Never sticks, and can be relied upon at all times when using exhaust steam for heating; or when used as a relief, or free exhaust on a condensing plant, it has no equal. It is noiseless and free from any complicated attachments.

JENKINS BROTHERS. NEW YORK, PHILADELPHIA, BOSTON, CHICAGO.

DIXON'S SILICA GRAPHITE PAINT

FOR TIN OR SHINGLE ROOFS AND IRON WORK. Tin roofs well painted have not required repainting for 10 to 15 years.
IT IS ABSOLUTELY WITHOUT AN EQUAL.

If you need any paint it will pay you to send for circular.

JOSEPH DIXON CRUCIBLE CO., Jersey City, N. J.

FOR GREAT TENSILE STRENGTH, ELASTICITY AND ELONGATION, COUPLED WITH UNUSUAL NON-CORROSIVE QUALITIES,

Castings and Propeller Wheels

MADE FROM

PARSONS MANGANESE BRONZE

CANNOT BE EXCELLED. WRITE FOR PARTICULARS.

SOLE MAKERS.

THE WILLIAM CRAMP & SONS

Ship and Engine Building Company,

PHILADELPHIA, PA.

A paper that is paid for and read—THE IRON TRADE REVIEW.

Belting.

Boston Belting Co.'s standard	dis 70 & 10
" " " extra	dis 60&10
" " " best	dis 55
Cleveland Rubber Co. extra standard	dis 60&10
Hoyt's Short Lap	dis 50
Shultz Raw Hide Leather Belting, single	dis 40
Munson's Short Lap Single Leather	dis 50
Munson's Short Lap Double and Light Double Leather	dis 50&10
Shultz Raw Hide Leather Belting, Double and Light Double	dis 40
Standard, oak tanned	dis 50&10
Alexander Brothers' pure oak tanned	dis

Blowers and Exhausters.

B. F. Sturtevant's	dis 20
Boston Blower Co.	dis 35

Chucks.

Cushman's 4 Jaw Independent	dis 45
" Combination	dis 40
" Geared Scroll	dis 60
" 2 Jaw Brass Workers	dis 30
" Drill	dis 35
Wescott's Scroll Combination	dis 33⅓
" Independent	dis 40
" Little Giant Drill	dis 33⅓
Horton's Independent	dis 45
Whiton's Independent	dis 45
National Combination	dis 45
Sweetland "	dis 40
Almond Drill	dis 40
Morse "	dis 20
Skinner's Combination Lathe	dis 40&15
" Independent Lathe	dis 40&10
" Universal Lathe	dis 40&10
" Drill	dis 30

Cutters and Reamers.

Cleveland	dis 10@1
Pratt & Whitney	dis 10@1
Standard	dis 10@1
Morse	dis 10 to 1
Brown & Sharpe, Milling Cutters	dis 15
" " Gear Cutters	dis 15

Crowbars.

Cast Steel	₩ 3¾
Iron, steel points	₩ lb 1

Drill and Drill Sockets.

Twist Drills	
Morse Taper & Straight Shank to 1¼"	dis 50 & 10 to 60
Morse Taper and Straight Shank Larger than 1¼"	dis 25
Drill Sockets	dis 25
Standard Twist Drills	dis 60@60&5
Cleveland " "	dis 60@60&5

Emery.

	No. 4 to No. 54 46 gr.	150 gr.	Flour, C. F
Kegs, ₩ lb	4¼c	5 c	2¼c
½ kegs ₩ lb	4¾c	5¼c	2¾c
¼ kegs ₩ lb	5 c	5½c	3 c
10 lb cans, 10 in case	6 c	6½c	c
10 lb cans less than 10	10 c	10 c	¼c

Emery Cloth and Paper.

Barder, Adamson & Co.	dis 50@50&5
H. H. Barton	dis 50@50&5

Emery Wheels.

Detroit	dis 60@70
Norton's	dis 60@70
Crant	dis 60@70
Sterling	dis 60@70
Celluloid	dis 10&33⅓
Northampton	dis 50
Crystal	dis 65@70
Vitrified	dis 60@70
Vulcanite	dis 60&10
Hamden	dis 60&10@70
Cyclone	dis 60@60&10

Files.

Arcade	dis 60&10@60&10&10
Nicholson	dis 60&10@60&10&10
" X. F	dis 25
Kearney & Foot	dis 60&10@60&10&10
Black Diamond	dis 60&10@60&10&10
McClellan	dis 60&10@60&10&10
Disston's	dis 65@70
Western	dis 70
Stub's	dis 2
Grobet's	dis 30
Reynolds Bros.' Hand Cut	dis 55
Industry File Works Hand Cut	dis 50

Hammers.

P. S. W	dis 40
Atha new list, Jan. 15, 1897	dis 50
Heavy hammers and sledges under 5 lbs	10c
" " " " over 5 lbs	8c

Jack Screws.

Illinois Bolt Co. list	dis 75

Nuts and Washers.

Size of bolt inches	¼	5-16	⅜	½	⅝	¾	1
Square	8	7	5½	4½	4	3½	3⅛
Hexagon	15⅝	11⅛	8⅛	6	5⅛	5⅛	
Washers	9	8	7	5	4½	4½	4½

In lots less than 100 lbs, ₩ lb add ½c., 1 lb boxes add 1c to list.

Nails (wire).

Standard Penny Nails, ₩ keg, base.
{ Car lots $1.30
{ Less than car lots $1.4

Oilers.

Zinc and Tin	dis 6
Brass and Copper	dis 50
Malleable (Hammer's), No. 1, $3.60; No. 2, $4.00; No. 3, $4.40 ₩ doz	dis 10@10&15

Picks.

Railroads, 5 to 6 lbs	dis $12 60
" 6 to 7 lbs	dis $13 60

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	Arrive.	Depart.
Valley Jctn. & Way Stations..	*6:25 P M	*7:25 A M
Marietta, Wheeling & Chicago	†9:25 P M	†7:25 A M
Cleveland Press Special.....	†9:25 P M	†2:00 P M
Akron, Canton & Wheeling...	*10:30 A M	*3:30 P M
Akron, Canton & Chicago.....	*8:05 A M	*6:35 P M
Akron, Canton & Marietta,...	†2:10 P M	†11:00 A M
Pittsburg, Washington, D. C., & Baltimore.....	*11:30 A M	†2:00 P M
Akron Theatre Train.....		†11:10 P M

†Daily except Sunday. *Daily. Pullman's Palace Vestibule sleeping cars between Cleveland and Chicago, also Cleveland and Baltimore.

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Railroad Company.

Time Table effective May 15th, 1898.
Cleveland Depot: Foot of South Water Street.
Elyria Depot: Huron St., West Side.

South Bound.			Central Standard. Lorain Branch	North Bound.		
15	13	11		12	14	16
P.M.	P.M.	A.M.	LV. AR.	A.M.	A.M.	P.M.
4:25	2:25	6:27	Lorain	9:15	11:35	7:30
4:40	2:30	6:44	Elyria.....	9:00	11:21	7:16
4:56	2:55	7:04	Grafton	8:43	11:07	6:58
5:15	3:12	7:23	Lester.....	8:25	10:50	6:40
5	3	1	Main Line	2	4	6
5:30	2:25	7:20	Cleveland	8:30	11:50	7:15
5:47	2:41	7:36	Brooklyn	8:14	11:34	7:01
6:41	3:26	8:22	Lester.....	7:29	10:49	6:19
6:52	3:35	8:30	Medina.....	7:16	10:37	6:07
7:05	3:46	8:41	Chippewa La	7:04	10:26	5:55
7:20	4:01	8:56	Sterling.....	6:48	10:12	5:40
8:09	4:46	9:45	Massillon	6:00	9:23	4:54
8:55	5:31	10:34	Canal Dover.	5:11	8:36	4:10
9:02	5:38	10:41	New Philade	5:04	8:28	4:03
9:20	6:05	11:25	Uhrichsville	4:45	8:10	3:45
.....	8:10	1:30	Bridgeport...	.....	6:05	1:40
.....	8:25	.....	Bellaire.....	.....	5:50	.....
P.M.	P.M.	P.M.	AR. LV.	A.M.	A.M.	P.M.

No. 9 leaves Lorain 9:50 a.m., Elyria 10:05, Grafton 10:21; arrives Lester Junction 10:40. No. 10 leaves Lester Junction 3:25 p.m., Grafton 3:42, Elyria 3:57; arrive Lorain at 4:10 p.m.

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The lists of Plate and Sheet Mills and of Tin Plate and Stamping Works are much more complete than in previous editions. The names and location of all the works described are given in alphabetical order, followed by a description of their character, capacity and products, with the names of the principal officers, etc., including the names of selling agents. This edition makes a cloth-bound book of nearly 400 well-printed pages—many more than in any previous edition. It contains a complete list of all the

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Tin Plate Works,
Stamping Works,
Forges and Bloomaries,
Wire Rod and Wire Mills,
Wire Nail Works,
Iron and Steel Bridge Builders,
Iron and Steel Ship Builders,
Horse-Nail Works,
Locomotive Works,
Malleable Iron Works,
Cast Iron Pipe Works,
Cast Iron Soil and Plumbers' Pipe Works,
Wrought Iron, Wrought Steel and Riveted Pipe Works,
Seamless Tube Works,
Chain Works,
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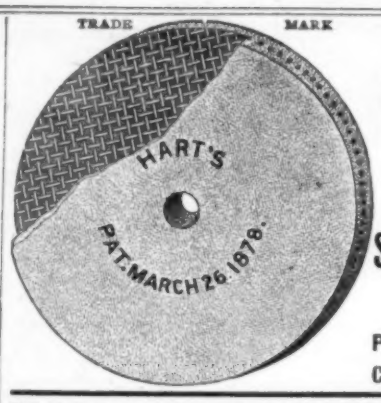

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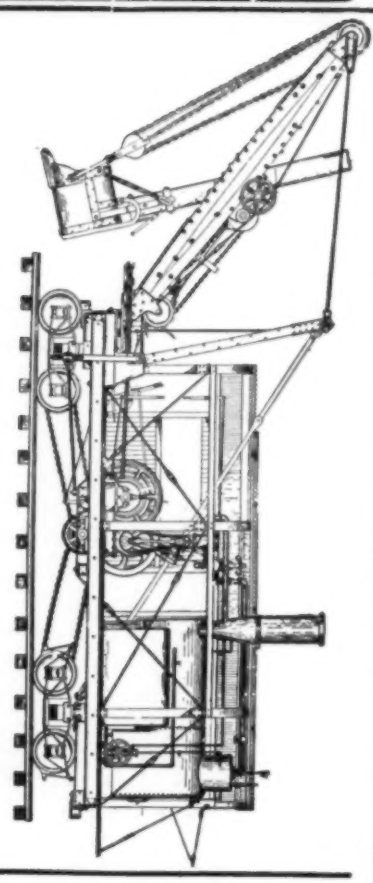

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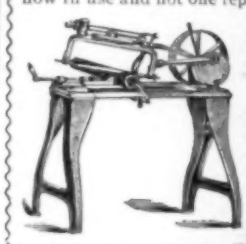

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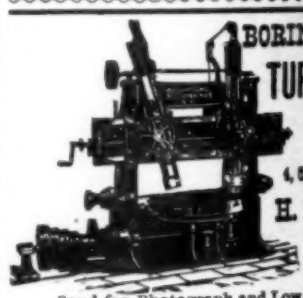

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